THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXIV. No. 586.] LONDON, AUGUST 4, 1874. [26TH YEAR.] Price 6d.

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COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
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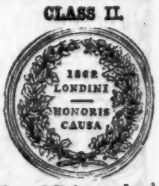

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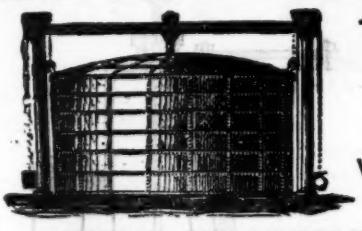

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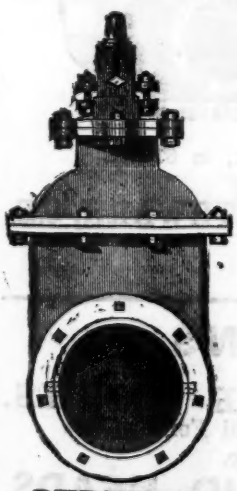


These solidly constructed double-faced Gas-Valves are superseding the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

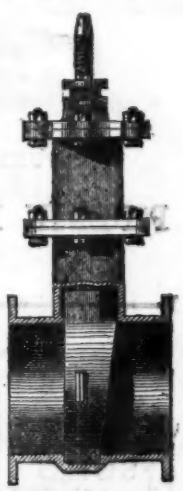
They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.



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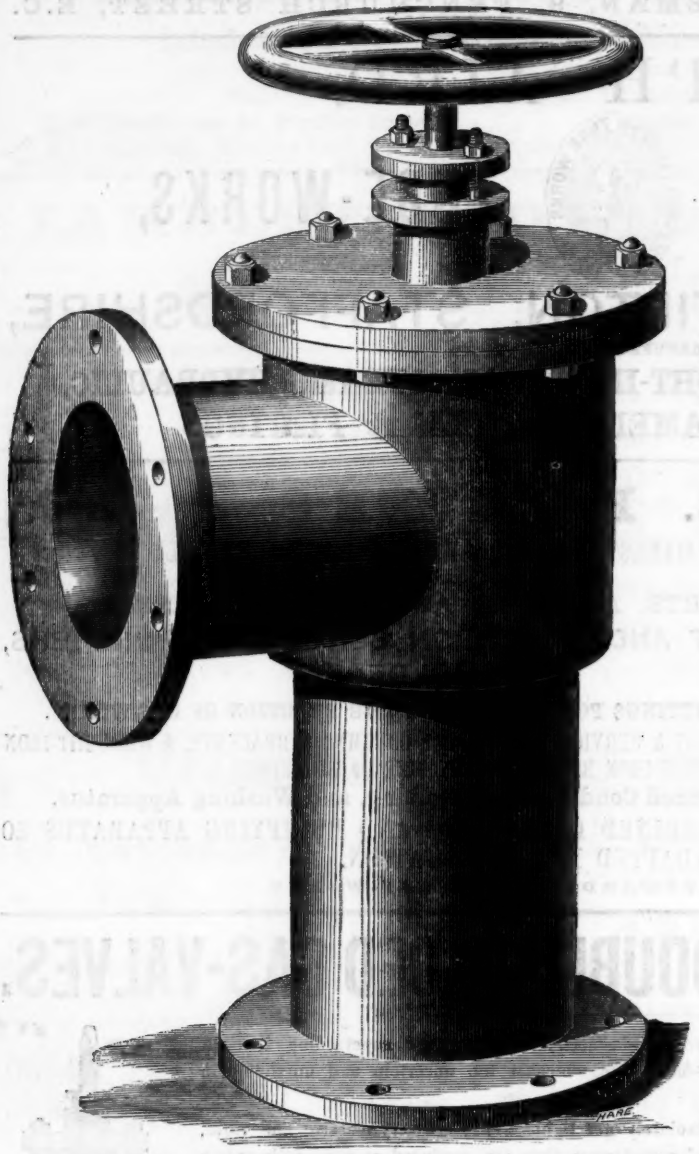
COMBINED ENGINES AND EXHAUSTERS.



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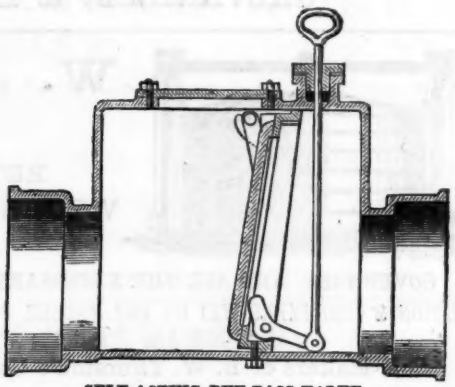
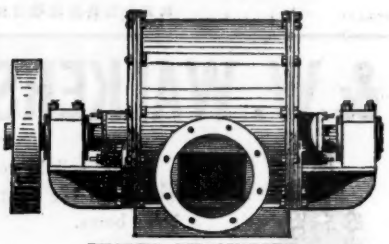
These Valves have been specially designed by G. Waller and Co. for Beale's Exhausters. They are most effective in action, and have given universal satisfaction. They can also be made with spigot at base, to suit ordinary socket connexions.



SELF-ACTING BYE-PASS VALVE.



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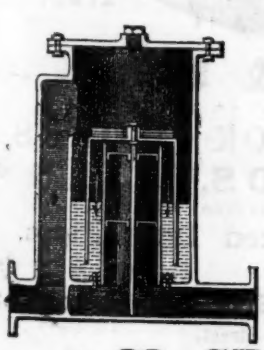

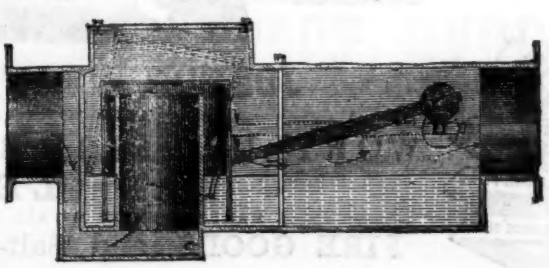

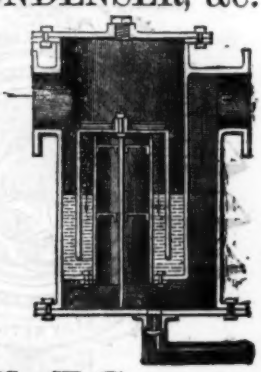

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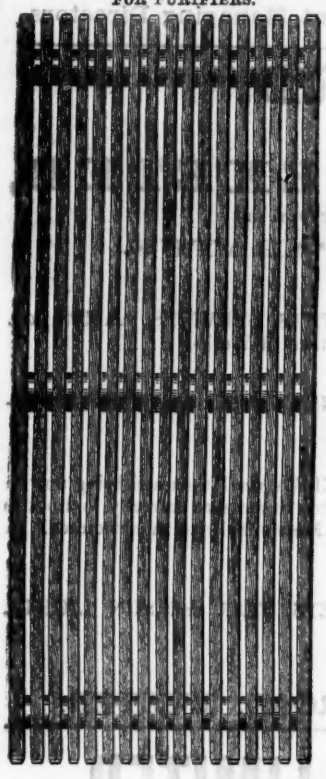

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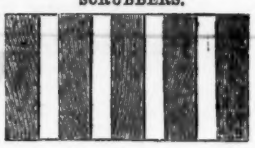

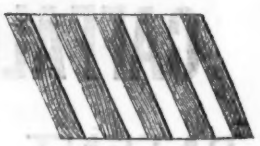

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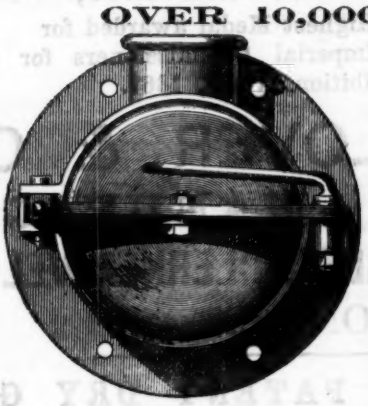
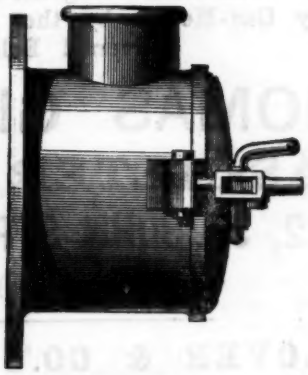
LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



FRONT VIEW.



SIDE VIEW.

SIMPLE.

ECONOMICAL.

DURABLE.

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

These Lids are Adopted by the following (among many other) Gas Companies:—

The Gaslight Company, Beckton (where over 2000 are in use).	The West Ham Gas Company.	The Salford Corporation Gas-Works.	The Carmarthen Gas-Works.
" Gaslight Company, Bow Common.	" Imperial Gaslight Company.	" Rochdale Corporation Gas-Works.	" Merthyr Tydfl. Gas-Works.
" London Gaslight Company.	" Gas-Works, Arsenal, Woolwich.	" Liverpool United Gas-Works.	" Ystrad Gas-Works.
" Independent Gaslight Company.	" Commercial Gas Company.	" Birkenhead Gas-Works.	" St. Alban's Gas-Works.
" Phœnix Gaslight Company.	" Alliance and Dublin Gas-Works.	" Birmingham Gas-Works.	" Over Darwen Gas-Works.
" South Metropolitan Gaslight Co.	" Edinburgh Gas-Works.	" Nottingham Gas-Works.	" Aylesbury Gas-Works.
	" Manchester Corporatn. Gas-Works.	" Newcastle-on-Tyne Gas-Works.	" Cardiff Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of any section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

The following important Testimonial, among others, has been given:—

"*The Gaslight and Coke Company (commonly called the Chartered Gas Company), Beckton, North Woolwich, July* 2, 1874.

"Messrs. Tangye Brothers and Holman,

"Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them. I should be very sorry to return to the old system of luting, and our stokers here freely acknowledge the benefit to them of the new system.

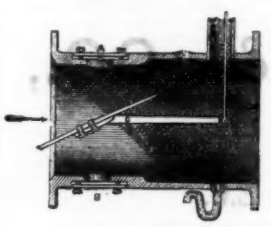
"I am, yours truly,

(Signed) "G. C. TREWBY.

"P.S.—We shall have very shortly about 3000 of your Lids in use."

SOLE MAKERS OF

HUNT'S PATENT EQUILIBRIUM GAS GOVERNOR.



In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown at C on the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

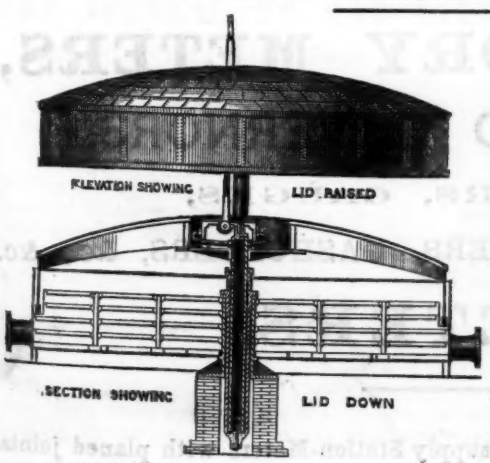
The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by several leading Gas Companies, among whom are the following:—

The Gaslight Company—a 24 in. at Whitechapel District Station.	The Gaslight Company—a 6 in. at the Gas-Works, Beckton.
" " a 36 in. at Goswell Road Station.	The London Gas Company—an 18 in. at the Gas-Works, Nine Elms.
" " a 24 in. at " "	" " an 8 in. at " "
" " a 24 in. at the Gas-Works, Beckton.	" " a 24 in. at " "

Also at the Gas-Works, Rochdale, Monmouth, Devonport, Cannes, and Mentone (France), &c.



PATENT SELF-CONTAINED

DIRECT HYDRAULIC LIFT

FOR PURIFIER LIDS

REQUIRES NO TRAVELLERS, CRANES, CHAINS, OR OTHER GEAR.

SAFE, SIMPLE, AND DURABLE.

ANY SIZE LID MAY BE RAISED BY ONE MAN.

Eight Hydraulic Lifts have been applied at Beckton Gas-Works to raise the Covers of the large Check Purifiers, which are 40 feet diameter, during the past three years, with perfect success.

London 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

MANUFACTURERS OF

PATENT WET & DRY METERS,

STATION-METERS AND GOVERNORS,

PRESSURE REGISTERS, GAUGES,

EXPERIMENTAL METERS, PHOTOMETERS, GASHOLDERS, &c., &c.

WATER METERS.

W. P. & Co. beg to state that they are now prepared to supply Station-Meters with planed joints.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 4, 1874.

Circular to Gas Companies.

We are now in possession of the intentions of the Metropolitan Board of Works with respect to the gas supply of the metropolis. They intend to follow the example set by the Corporation of the City of London in 1866, and apply to Parliament for power to furnish an independent supply. We do not for a moment suppose that any member of the Board expects, or even wishes, to obtain such power, which every one must see would be in the highest degree embarrassing. Supposing it were obtained, in what favoured locality of the enormous area over which they have jurisdiction would the Board commence operations? How many years would elapse before a retort was set and a mile of main laid down? And last, but not least, what would the cost be? And what, before any substantial competition was established, would be the condition of gas industry? Considerations of this kind evidently weigh with the Board, and we believe we are right in making the assumption that, notwithstanding all they say, they are by no means anxious to obtain power to establish competing works. The object of the proposed Bill is evidently the same as that of the Corporation Bill—namely, to obtain some modification of existing legislation—this time to affect the whole of the metropolitan gas companies. But, unfortunately, the debate affords us little information as to the alterations in the law actually desired by the Board. The most we can gather is from the speech of Mr. Newton, who has adopted the notion of a sliding scale of dividend according to price. There was also a suggestion of nominee directors as at Sheffield. Now, to a sliding scale of dividend no objection would be made, if the limit of 10 per cent. be removed. If the price of 4s. is to give 10 per cent., and 4s. 3d. only 9½ per cent., surely the reduced price of 3s. 9d. should allow the company to divide 10½ per cent.; otherwise, where is the inducement to sell at a lower price than 4s.?

On the whole, we do not see much to complain of in the statements and arguments used by the speakers. One adopted the extraordinary notion that the receipts of the gas companies constitute so much taxation, and he professed astonishment that gas companies should be allowed to raise nearly one-eighth of the rateable value of the metropolis, while the Metropolitan Board could only raise one-fiftieth. He might, with as much reason, have deplored the fact that the publicans raise a great deal more than the whole rateable value. The simple fact is that the charge for gas is the price of a manufactured commodity produced and distributed at much cost, and to consider it as a tax is to indulge a ridiculous fallacy. It was a modest suggestion, too, that gas shareholders might voluntarily sacrifice 40 per cent. of their property in order to be on good terms with the Metropolitan Board. The speaker, we have no doubt, is himself possessed of an eminently self-sacrificing spirit, still we may question whether, if he held gas stock worth to-day £170, he would next year consent to a change which would reduce the value of his property to, say, £110. No; he is human, like the rest of us, and would, we expect, be the first to raise a cry of "Confiscation," if it were proposed to make the change at his expense. Six per cent. may be a fair limit for new capital—it is now usually fixed at 7 per cent.; but to alter the limit on expended capital would be confiscation pure and simple. The Board need not expect any concession on that ground. There we stand firm and immoveable, certain of the support of Parliament, so long as that body has any respect for legally acquired rights.

Other fallacies and illogicalities our readers will notice brought forward in the debate, as, for example, when one speaker argued that because the Government had bought up the telegraphs, and had a monopoly of letter-carrying, therefore the Metropolitan Board ought to have power to set up competing gas-works. We need not occupy our space in exposing these, but we may speculate for a moment on what the upshot of the proceedings of the Board may be. We regard the rejection of any Bill promoted by the Board to obtain power to furnish an independent supply of gas as so certain, that we do not think the companies need trouble themselves much in opposing it. The Board of Trade may be persuaded to introduce some measure to bring all the metropolitan companies under such legislation as the Acts of 1869, but this need not be looked forward to with any alarm. With a reduced maximum price must come provisions for a revision of price in case of necessity. Since 1869 a severe lesson has been learnt.

No one knows how soon another coal crisis may occur. We notice with pleasure that the iron manufacture is rapidly reviving, and that means dear coal. With continued peace and prosperity, all the conditions which brought about the great rise in the price of coal will be reproduced, and our expectation is, that next year will find coal as dear as ever. The times are by no means auspicious for starting gas-works at all, and certainly not for starting competing undertakings. This consideration is, however, of little importance. A generation would elapse before any effective competition was established in this metropolis; and long before that the Board would have discovered that their money was wasted. They would have brought down the profits of gas companies, but would never have made a fraction of profit for themselves. But this reflection, too, is needless. The Metropolitan Board may, if they please, buy up the metropolitan gas undertakings; but if they imagine they will get power to establish competing works, we believe they are egregiously mistaken.

The report and statement of accounts of the Imperial Company, to be presented to the half-yearly meeting on the 7th inst., reveal a very unsatisfactory state of affairs. Notwithstanding the increase of price for the year, granted by the Revision Com-

missioners, the net balance available for dividend is £26,583 short of the sum required. This deficit will totally extinguish the reserve-fund of the company, which, on June 30, amounted to £27,512; but this sum is invested in Three per Cent. Consols, now standing at 92¼. A clear and satisfactory explanation of the position is given by the directors. The estimate they presented to the Revising Commissioners in February was based on an estimate of the working for the whole year. Up to the end of the half year they had not experienced the benefit of the fall in coal, in consequence of unexpired contracts at high prices. Another cause of loss is the low price obtained for coke. In the current half year the directors naturally hope for better results. They may expect to make their dividend; but we fear they will have a very small balance to commence a new reserve-fund with. We could hope that another application to the Board of Trade may not be necessary; but we fear it is inevitable. The cost of the Revising Commission we see is estimated at £2437, and the directors propose to pay the whole out of last half year's revenue. A new feature in the accounts is a "Statement of the gas made, sold, &c." From this we learn that the *estimated* amount of gas made from 206,994 tons of coal was 1,949,383,000 feet, and that the total quantity sold, partly estimated, was 1,767,768,000 feet. Adding to this 26,303,000 feet consumed on works, &c., and subtracting the whole from the total quantity made, it will be seen that 155,312,000 remain unaccounted for. The gas sold, calculated per ton of coal, shows a sale of 8511 feet per ton. This additional account is, we presume, ordered by authority, and we suppose a similar statement will appear in the accounts of the other companies.

On no subject do a simple British public appear so gullible as on gas matters. A paragraph, which will be found in another column, has gone the round of the papers, stating that gas is about to be made in Manchester from sewage. The patentee says that he injects fœcal matters, properly diluted with urine or water, and strained from solid matters, into a red-hot retort, which may be made of cast or wrought iron, copper, brass, fire-clay, "or any other material"—gold or brown paper, we dare say. If he uses iron, he will quickly burn out his retorts; but he will, for a time, get a little hydrogen gas, which, with some disgustingly fœtid vapours, are to pass along to a vessel charged with "a powerful hydrocarbon or carbons"—an ordinary carburettor, in fact. With any other than iron retorts he will, of course, get no gas at all. These preliminary puffs always herald the launching of a limited company, and we expect every day to see one advertised to work this invention. If, as seems to be the rule, the capital proposed for a company is always in an inverse proportion to the merits of the scheme to be exploited, a good round sum will be asked for in this case. The distinguished inventor of the process, we see, describes himself as a "commercial traveller."

In a recent "Circular," in alluding to a reduction of price by the York Gas Company, we spoke of that company as furnishing one of the cheapest supplies in the kingdom. A correspondent writes to inform us, and wishes us to mention, that the British Gas Company is now supplying Hull at 2s. 6d. per 1000 feet.

Water and Sanitary Notes.

A QUESTION of some interest to water companies in general has cropped up at Richmond, Surrey. The town is supplied by the Southwark and Vauxhall Company, but it is not within the statutory limits of the company. The vestry are, with or without good reason, greatly discontented with the quality of the water supplied, and, having fixed upon some wells, have endeavoured to obtain from the Local Government Board power to raise money and make compulsory purchase of lands with a view to lay down water-works. But the Public Health Act, 1848, says that it shall not be lawful for a Local Board to construct or lay down water-works when there is within the limits a company able and willing to lay on water proper and sufficient for all reasonable purposes. The contention of the Richmond Vestry is that, not being within the statutory limits of the company, the company are to be considered as non-existent. The Local Government Board do not agree with them, and appear to have refused a Provisional Order. Thereupon, the vestry consult eminent legal authorities, and this is their opinion: "The vestry cannot by any process compel the Local Government "Board to issue a Provisional Order giving compulsory provisions "to purchase lands for purposes of water supply, or to sanction a "loan, and if the Board cannot be induced to alter the opinion "which they appear to have formed on the advice of their counsel, "the vestry are powerless in the matter." The point of interest is this: the company in possession need not be one endowed with statutory powers. So long as they are able and willing—and the Southwark and Vauxhall Company undoutedly are—to give a proper and sufficient supply for all reasonable purposes, a local authority cannot with public money set up competing works. If the supply is not considered "proper," the law affords an obvious remedy. According to report, Thames water must be distributed in Richmond without filtration—in fact, just as it is pumped from the river. Small fish, and even newts, are sent through the pipes and issue from the taps. This is a state of things which the company are bound to alter, and now that they are assured of their legal position, we should hope they would do so without delay.

In imitation of the House of Lords, the Commons have, on the motion of the Home Secretary, adopted some new Standing Orders, having for their object the protection of the labouring classes. It is not often that gas and water undertakings displace houses, but they do occasionally, and it is right that these new Standing Orders should be brought to the notice of our readers. They are as follows:—

1. In the case of any Bill by which power is sought to take, in any city, town, or parish, 15 houses or more, occupied either wholly or partially, as tenants or lodgers, by persons belonging to the labouring classes, the promoters be required to deposit in the Private Bill Office, on or before the 31st day of December, a statement of the number, description, and situation of the said houses, the number (so far as they can be ascertained) of persons to be displaced, and whether any and what provision is made in the Bill for remedying the inconvenience likely to arise from such displacement, and that such statement be referred to the committee on the Bill.

2. In every Bill by which power is sought to take, in any city, town, or parish, 15 houses or more occupied either wholly or partially as tenants or lodgers, by persons belonging to the labouring classes, a clause shall be inserted to enact that the company shall, not less than eight weeks before taking any such houses, make known their intention to take the same by placards, handbills, or other general notice placed in public view upon or within a reasonable distance from such houses, and that the company shall not take any such houses until they have obtained the certificate of a justice in England and Ireland, and of the sheriff in Scotland, that it has been proved to his satisfaction that the company have made known their intention to take the same in manner required by this provision.

3. In every such Bill a clause shall be inserted, if applicable, requiring the promoters to procure, within a time to be limited, sufficient accommodation for persons belonging to the labouring classes who will be displaced under the powers of the Bill.

4. The committee upon every such Bill shall report specially to the House—1. Whether such a clause has been inserted in the Bill, and, if not, the grounds upon which the committee have decided it to be inapplicable. 2. The several circumstances affecting the displacement of persons by the operation of the Bill, and the means by which other accommodation is to be provided for the persons to be removed.

These orders add largely to the responsibilities of companies. We do not say they are unjust, but we may take them as a sample of the obstacles which a certain class of sentimental politicians will place in the way of public improvements. Henceforward a railway entering a populous town must become a landlord on a considerable scale, with results not to be foreseen at once.

Correspondence.

GIROUD'S RHEOMETER.

SIR,—I have read, with great interest, your last issue, containing a letter from Mr. W. Sugg about Giroud's rheometers. Mr. Sugg says:

"A lamp-governor regulated either upon my first or second system, or that of Mr. Giroud, cannot maintain the same consumption if the burner to which they have been regulated is changed for a larger or a smaller one. . . . If, then, a fresh regulation is required for every alteration of the burner, there can be no advantage gained by Giroud's system over Sugg's."

Allow me to observe that certainly there is a mistake in this. Giroud's rheometers do *not* require a fresh regulation for every alteration of the burner. They would only be unfit for a *smaller* burner than they are made for, but a larger one would not in the least affect their consumption. A rheometer intended for the consumption of 140 litres (or 5 cubic feet) of gas per hour would not, and could not, consume a single litre more if a 6 cubic feet, an 8 cubic feet, or a 10 cubic feet burner were substituted; nay, if no burner at all were used, and the gas allowed (lighted or not) to escape freely at the ¼-inch orifice of the rheometer, the consumption would be 140 litres, *and no more*.

The simple theory of Giroud's governor, so well explained by your Paris correspondent in No. 583 of your JOURNAL, proves this to evidence, and this fact is quite confirmed by experience. I have tried these rheometers with severe cold and in excessive heat, and found them always of uniform consumption. Of course, it is not my intention to "throw cold water" upon Mr. Sugg's most excellent lamp-governors, which are certainly the best dry pressure-governors at present in use. The difference is only that Giroud's rheometer is not a *pressure*-governor at all, but a regulator for *constant volume*.

The great advantage of this apparatus is that gas companies have no longer an interest to discuss the size of the burners in street-lamps, since a large burner will not consume more than a small one. The necessity of meter indication for public lights seems also much lessened by the use of this apparatus, as uniform consumption is by it guaranteed to both sides.

Vienna, July 29, 1874. CIVIS ROMANUS.

A QUERY—THE COST OF GAS IN BIRMINGHAM.

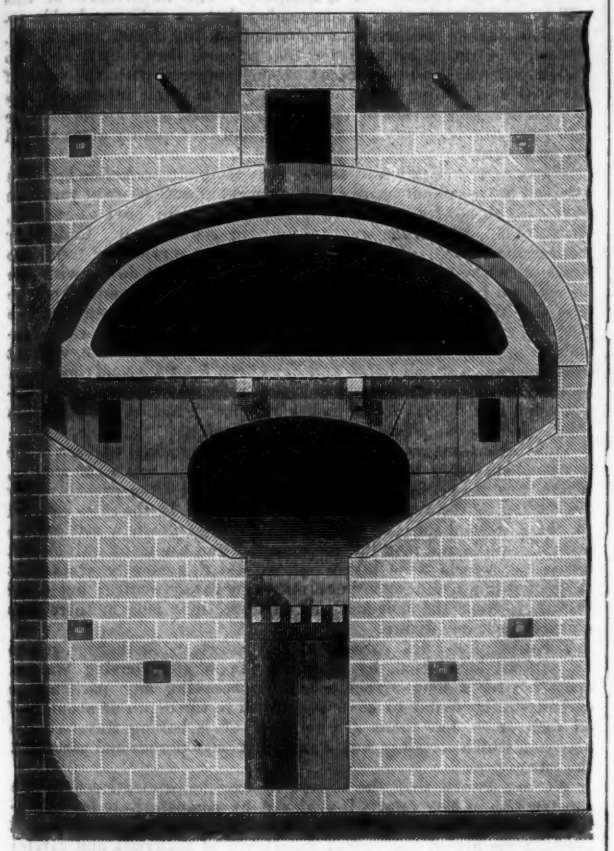
SIR,—In your report of his address to the members of the North British Association of Gas Managers, Mr. Foulis is made to say that "in Glasgow, with 106,000 meters, and gas at 4s. per 1000 feet, the total gas revenue was £252,000; while in Birmingham, with only 50,000 meters, and gas at 2s. 3d. and 2s. 7d., the rental was £236,000. From this it would seem that if the same quality of gas was supplied in Birmingham, and sold at 2s. 3d. instead of 4s., it would cost the inhabitants £250,000 per annum more than they now pay for the same amount of light."

May I ask if the latter sentence has been correctly reported?

Birmingham, July 31, 1874. CHAS. HUNT.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

XXIV.



To John Grafton is indirectly due the merit of introducing clay retorts, with all the various advantages derived therefrom; although by the specification of his patent of 1820 it is evident their manufacture had been previously attempted and failed, in consequence of their tendency to crack. To remedy this evil, he proposed to construct them of several pieces, put together with fire-clay, in theory identical with the most approved manner of making clay retorts at the present day.

The first retorts or ovens constructed by that gentleman were square, capable of containing about 4 cwt. or 5 cwt. of coal at each charge; subsequently they were altered to the form represented in the above figure, and increased in size so as to be capable of receiving a charge of 10 cwt. or 12 cwt. of coal, which was carbonized in four or five hours. They were built entirely of bricks of about seven or eight different forms and sizes, grooved together, or set with fire-clay, and afterwards covered with a coating of cement, of which, pounded glass formed an important portion.

Retorts according to this patent were erected at the Cambridge Gas-Works, in June, 1824, and the following year were put in action, at which time they also came into use at the Wolverhampton Gas-Works, and very shortly afterwards were tried at Halifax, and the Blackfriars works, London.

According to Merle, the durability of the first brick ovens constructed by Grafton extended beyond six years active service, yet he met with the greatest opposition from gas companies wherever he proposed them; and in some instances after they had been constructed and in operation, such was the prejudice against their use, that the workmen wilfully and maliciously destroyed them. But by dint of energy and perseverance they were gradually extended to the Continent, where we have seen them in many gas-works of considerable importance.

The author referred to says: "At first the greatest inconvenience attending the use of these retorts was the accumulation of carbon therein; and, in order to remove this, they were put out of action, and allowed to cool, when a workman entered, and with a hammer and chisel cleared out the incrustation, which, in some instances, assumed a thickness of three or four inches." From Merle we also learn that Grafton subsequently discovered that by leaving the retort open for some time, it was cleared of the carbon, through the influence of the atmospheric air. He then arranged a "simple means of getting rid of it, which succeeded perfectly. This consisted in leaving an opening at the end of the retort, which was covered by a cast-iron cap, and every week this was removed so as to permit the air to pass therethrough, when, in an hour, all the carbon was cleared out." Following closely on these observations were Grafton's experiments to ascertain the cause of this deposit, which resulted in the discovery that it was mainly produced by the gas being subjected to heavy pressure when in the retort. The knowledge of this fact led to his invention of the exhauster, the importance of which is now so universally appreciated.

The writer's experience of Grafton's ovens does not justify the expression of a favourable opinion of them, the only advantages they possessed were their durability, averaging about four years, and the excellent large coke they produced; but, on the other hand, they were very costly in construction, and their consumption of fuel was enormous, being equal to about 70 per cent. of the coke produced. This, however, may have been partly due to the bad construction of the furnaces, which were immoderately large, and to the absence of dampers. Therefore, although those ovens had prepared the way for the use of clay retorts, by which they were gradually superseded in all gas-works, they were eventually abandoned, mainly on account of the large quantity of fuel they demanded.

Other engineers and manufacturers have since produced retorts constructed similarly to Grafton's, with the exception that the lower part is composed of fire-tiles and the form slightly varied; and in some establishments, in Scotland and elsewhere, they are exclusively employed at the present day. Brick retorts at many works are used in the depth of winter, when required only for a few days, and then are thrown out of action; on being again employed, they are found to be free from escapes. With the present excellence attained by some manufacturers of clay retorts, we are of opinion that for such purposes brick retorts are quite unnecessary.

Clay retorts, and of cylindrical form, were first made and used by Mr. Herst, of Leeds, about 1826. These were about 12 or 13 inches in diameter, made in lengths of 4 feet, which were jointed together in the oven, and the ends placed on to them—a system still adopted in some works, but more frequently they are made in lengths of 8 feet or 9 feet, and under, and when necessary, the ends formed with them. About 1827, clay retorts were introduced into Scotland at the works of Kirkcaldy, Dunfermline, and Stirling, and, meeting with success, they were subsequently adopted by the Edinburgh and Leith Gas Company. At this period a manufactory for these articles was established in that country, which is still in existence.

We are disposed to believe that the success attending the first retorts manufactured in Scotland arose from some peculiarity in the clay used, so that, in the act of heating, the retort made therefrom neither expanded nor contracted, and, in consequence, they did not break or crack.

Yet, notwithstanding the gradual and increasing use of clay retorts in Scotland, gas companies in England generally were directly opposed to them, and the manufacturer of these articles, after several fruitless journeys to London, for the purpose of introducing them to the gas companies there, succeeded only in placing a few of them at a small suburban works then in existence. Discouraged by the opposition, and the rebuffs he met from the gas engineers and managers of the day, he ceased to press a business which was yet destined to be productive of such great advantages to gas companies throughout the world.

We have referred in our historical sketch to the visit made by Mr. Lowe to Scotland in 1843, with the intention of inspecting the gas-works of that country. That of the Edinburgh and Leith Company, of which Mr. Lyons was then manager, was the first to engage his attention, where he was shown clay retorts in active operation, which to him were a great novelty; but the visitor having no conception that the works were carried on with these alone, inquired the number of iron retorts they had in use. "None," was the reply; "and if they were given to us we would not use them"—an opinion now universally entertained by engineers, inasmuch as iron retorts for the purpose of carbonizing coal, would be literally "dear as a gift."

The following year, as stated, clay retorts were introduced into the Brick Lane station, but from the defective nature of the material of which they were formed, they cracked, and the great experiment resulted in failure. If we remember rightly, these were among the first produced by an English firm, which has since that period acquired a high reputation for the manufacture of these goods. This failure was a serious impediment to the use of clay retorts, and it was not until five or six years afterwards that the late Mr. Livesey, of the South Metropolitan Company, set the example by adopting them at his works, the success of which contributed considerably towards their subsequent general introduction.

In the years 1850 and 1851 a lengthy and animated correspondence took place in the columns of the JOURNAL OF GAS LIGHTING, between two gentlemen of eminence in the profession, both, at the time, entirely unknown to each other, under the *noms de plume* of "Alluminum Ferrum" and "Experimentum Crucis," the former strongly advocating the merits of iron retorts and condemning those of clay, whilst his opponent maintained with considerable ability the great advantages to be derived from the use of the latter.

The arguments employed by "Alluminum Ferrum" were, the liability of clay retorts to crack when exposed to the necessary heat; their extreme porosity, which could only be remedied, as he asserted, by six months working, when the retorts would be sound enough to retain the gas produced; and that the material of which they were formed being such a bad conductor of heat, a much larger amount of fuel would be required for carbonizing. And, singular enough, this staunch opponent of clay retorts suggested that, for them to become useful, "their manufacturers could not devote too much care in rendering them of the *closest texture* possible." Experience since then has proved this to be the very worst system that could be adopted, and that retorts so made must of necessity crack and become useless.

The advocate of clay retorts met these arguments, by statements of facts, by which he proved that a greater yield of gas was obtained from coals with clay retorts than with those of iron, and

that the former were sound from the first day they were used; thus disposing of the charges of porosity and the tendency of clay retorts to crack. He further argued that, inasmuch as iron retorts were shielded by fire-slabs and shields, the same non-conducting material existed in their settings as in those of clay; and he further proved that, practically, no more fuel was required with the latter than with the former.

During this correspondence some Scotch engineers came forward in support of clay retorts, and furnished drawings, the results of operations carried on with them; these, with the success of Mr. Livesey's experiments, turned the scale of opinion in their favour, from which period, 1852, they began gradually to be employed; but so slow was the progress, that only five years ago they were adopted at the works of a large city in Scotland. Dr. Fyfe, at the same epoch, and through the same medium, when alluding to the deterioration of gas in consequence of the deposit of carbon in clay retorts, attributed this to the material of which they were formed, he then being undoubtedly unaware that the deposit depends entirely on the degree of heat of the retort, and the pressure the gas therein is subjected to; and under like conditions in these points it would occur irrespective of the nature of the material.

By some engineers, the roughness of the clay retort was supposed to cause the deposit, and patents were obtained for glazing them in their interior; but, when carried into operation, this produced no good results; for, supposing that glass retorts could attain that degree of heat, and sustain the pressure, the carbon would be deposited on them—equal pressure and temperature considered—with the same facility as on iron or clay.

It may be observed that the advocate of iron retorts—then the engineer of a metropolitan gas-work—displayed considerable consistency in his opinion, as subsequently the company he represented was the last in London to adopt clay retorts and the exhauster.

The writer, although well aware of the failure at Brick Lane, having had his attention directed to the commencement of the correspondence referred to, resolved to judge for himself on the merits of clay retorts by giving them a fair trial. For this purpose a number was ordered from two English manufacturers, whose retorts, for distinction, we will call A and B, and others from a Scotch manufacturer, designated C. The retorts A, judging from appearances, and with our limited knowledge on the matter at the time, were all that could be desired, highly finished, of very *close texture*, sharp angles, and nicely coloured at mouthpiece, completely putting the others in the shade, more particularly the retorts C, which had by no means a prepossessing appearance.

Five of each kind were set in their respective beds, and those marked A, being decidedly the most attractive, were the first to be tried, and for this purpose, with the view of preventing them cracking—a circumstance so much to be feared—they were heated in the most gradual manner possible, so that at the end of ten days they were at a temperature suitable for carbonizing; but, to our great mortification, when charging them, they were ascertained to be broken from end to end. Of course these, as well as the others purchased from the same manufacturer, were literally worthless, and had the trial been confined to them alone, the use of clay retorts would have been entirely abandoned. Fortunately, the B retorts counteracted the bad impression of the former, whilst those designated as C, surpassed our most sanguine expectations, and from that period clay retorts have been always adopted by us.

The process of manufacturing clay retorts consists in intermixing a quantity of pounded burnt clay in a granulated state, and sometimes sawdust, with a comparatively small quantity of plastic clay, from which compound the retort is formed by hand in one operation, for if it be discontinued even for a short time, the clay does not thoroughly unite at that point, so that it sometimes happens that after the retort is delivered at the works, by an accidental shock it is separated into two parts, the fracture clearly indicating the cause, as each part has a smooth surface, instead of the cellular appearance on the breakage of the material. The similarity of Grafton's ideas and this means of manufacturing clay retorts is very apparent, as, in most instances, the vessel was formed of "small pieces cemented together with fire-clay."

Good clay retorts are very friable; their texture is cellular and loose, but not porous (as has been so often asserted), inasmuch as they are capable of retaining gas at ordinary pressure, when cold, without any loss, which fact we have ascertained repeatedly by experiment. The best kinds we have met with are so tender as to require to be packed within a series of battens, or skeleton frame, secured with hoops, demanding the greatest care in transport and when being placed in their ovens, and their nature is such that the particles of burnt clay entering into their composition can be easily picked out with a penknife, or even with the nail.

On the first general introduction of clay retorts into England, when their manufacture was very inferior to that of the present time, considerable doubts existed as to their stability; they were, therefore, supported within the oven by a series of parallel walls, and this system has, in many works, been continued to the present day, the settings of one of the metropolitan companies having no less than eight 9-inch parallel walls, thus presenting a very considerable obstruction to the heat in penetrating to the coal undergoing carbonization, whilst the expense of construction is materially increased. That such means were necessary 20 years ago, when these vessels were imperfectly manufactured, may be admitted; but, at the present time, they are constructed of such excellence as to render such precautions unnecessary. During many years we have set them with the same simplicity as iron, of course, without the protection the latter demand, thus avoiding all useless expenditure, and unquestionably obtaining an economy in fuel for carbonizing.

Of all the various apparatus in a gas-works, the retorts are by far of the greatest importance, and, regardless of cost, only those of the best quality should be employed, for any economy obtained at the expense of excellence in these articles, must be highly detrimental to the interests of a company. The importance of this will be understood when we remember that an ordinary double retort will, during its lifetime, carbonize from 700 to 900 tons of coal. The price of the retort used for that purpose may vary from £7 to £10, a difference so insignificant, when compared with the value of the coal, and the probable loss arising from using inferior retorts extending over a period of two or three years, as to create surprise that price should be any consideration, and that quality alone should not be sought.

We have no hesitation in saying that complete perfection has been attained in the manufacture of clay retorts. For a series of years we have used those of a certain firm, whose name, for obvious reasons, we withhold, which, for quality, nothing could excel. Under our management, these retorts have been in active service for from two years to two years and a half, and on taking them down, with the exception of cracks at the bolt-holes, they were as sound as on the first day they came on to the works, but, of course, worn at the bottom by the action of the scoop and rake; and on some rare occasions they have been withdrawn after a like period of use, without even the cracks at bolt-holes, and have been reset a second time, with new ones, with all success. The retorts referred to were single, oval-shaped, 8 feet long, 1 foot 9 inches by 1 foot 2 inches, and 2½ inches thick, made in one piece, with the end complete.

These assertions may surprise many of our readers, who are in the habit of enclosing their retorts by the parallel walls referred to, where they are taken out piecemeal, and where often probably they are broken by the wall pressing against them. In the cases referred to, these were dispensed with, and in taking down a setting, the ascension-pipes and mouthpieces removed, and the front wall cleared away, the retorts were taken out, as stated, generally cracked at their bolt-holes, and sometimes, although rarely, entire; but in all instances, from the bolt-holes throughout their length, there was neither crack nor fissure.

The often pretended porosity of clay retorts is further proved to be without foundation, by examining them after having been in operation for a long period, when, on breaking any portion, the carbon will be found to have penetrated to the depth of about half an inch or so, but there are no signs of it having traversed the material, which certainly would exist if it were porous and permitted the gas to pass.

We are aware that the degree of excellence mentioned in the construction of clay retorts is achieved by comparatively few manufacturers; but, as the means of attaining it are well known, depending mainly on the proper admixture of materials and careful manipulation, to render the retort cellular and not of close texture, so that, when heated, it shall neither expand nor contract, there is nothing to prevent every manufacturer of these articles producing them of the quality described.

Clay retorts are now universally acknowledged to be the most advantageous for the economical production of gas and coke; their usage is not confined to large or medium-sized works, as often supposed, but may be extended to those having only one retort, care being taken to obtain retorts of the best quality. The duration of the iron retort averages about eight months, that of clay about two or two and a half years; showing a vast benefit alike for the largest as well as the smallest gas-works, which is greatly increased by the quantity of gas produced in a given time from the retort, as well as the augmented yield per ton.

(*To be continued.*)

Review.

On Poisoning by Inhalation of Coal Gas. By William Taylor, M.D.—Edinburgh: Maclachlan and Stewart. London: Hardwick. 1874.*

We do not often trouble our readers with any notice of medical publications; but as the writer of the paper, the title of which stands at the head of this article, has not confined himself to details and reflections interesting solely to his own profession, we make no excuse for dealing at some length with his publication. The particular accident to which the paper relates may be disposed of in a few words. On the morning of the 7th of June, Dr. Taylor was called to an Edinburgh hotel to see a gentleman who was obviously enough suffering from the effects of inhaling coal gas. It will not interest our readers to know how many and what enemata were administered, and how many sinapisms were applied, and how some half dozen doctors came and went. It is sufficient to say that the man died about 24 hours after he was discovered, never having regained consciousness; and we note with some astonishment that the inhalation of pure oxygen is not mentioned as having formed part of the treatment. It must not be supposed that we look with unconcern on these accidents. They are sad enough, but the truth must be told that, like explosions, they are more often than not the results of ignorance and stupidity. The patient was a Canadian, said to be unaccustomed to the use of gas; and it is conjectured that on going to bed he did with the gas as he might have done with a candle in the back-woods, and blew out the light instead of turning off the gas. The conjecture is not unreasonable, for we were told not long ago of a lassie recently imported from the country into a Scottish city who, on being told by her mistress to put out the gas, went and blew out the flames, leaving the taps turned on. The man occupied a room having a window but not a fireplace, the air space of which is said to be 947 cubic feet. The burner was one calculated to consume 3 feet of gas per hour. We are not told in express terms whether or not the tap was

* A paper read before the Medico-Chirurgical Society of Edinburgh, April 1 1874.

left fully turned on; but, on the supposition that it was, Dr. Taylor calculates that when the man was found, eleven hours after he went to bed, the air of the apartment could not have been contaminated with more than 3 per cent. of gas. The proportion was probably much smaller. So far it is interesting to know that breathing a mixture of air and gas, the latter gradually accumulating to something under 3 per cent. of the former, will prove fatal. It would be more interesting if it were possible to know what was the proportion of gas when the man became insensible. There is, however, no reason to doubt that breathing a comparatively small admixture of gas with air will soon produce insensibility. As regards this particular case, too, it must be remembered that the gas was rich cannel, which, if not more poisonous than common gas, will, in consequence of the larger proportion of marsh and olefiant gases, the sooner produce anæsthesia. If this were the only symptom resulting, the patients might be expected to recover; but gas, unfortunately, contains carbonic oxide, which cannot be removed, and which is a specific poison. The author of this paper gives a very badly translated abstract of M. Tourdes's account of the Strasburg poisonings with Selligue's water gas, which has been several times referred to in these columns. M. Tourdes proved conclusively that carbonic oxide was the poisonous ingredient in the Strasburg gas. It is said in this pamphlet that Sir James Simpson once thought of using coal gas as a substitute for chloroform; and, if we did not see that Dr. Taylor writes in a careless way, we should fancy that Sir James had used it, and abandoned it for a very stupid reason. Sir James Simpson doubtless gave up the notion for quite other reasons than those assigned here. Still Dr. Taylor is right when he says that if we could separate the pain-destroying from the life-destroying constituents in gas, we might find in the former a valuable and safe substitute for chloroform. We have said that carbonic oxide cannot be separated, but Dr. Taylor can make a mixture of marsh and olefiant gas which, properly diluted with air, and administered with fit precautions, would be as good and as safe an anæsthetic agent as any.

Here we might stop, but the author goes on to make some general reflections. As we read the reports of medical officers of health and other medical men, our wonder increases every day that there is a living and healthy body in these islands. To the fatal influences already alleged to exist in our midst, and incessantly dilated upon, our author adds another—gas leakage. This he evidently regards as pre-eminently dangerous to health, if not to life. "Who," he asks, "can tell how many of those obscure diseases, accompanied with cerebral symptoms which we cannot account for, may be due to this cause?"

But, as regards the causes of this leakage, as put forward by the author, we cannot refrain from making other quotations. He had some conversation respecting them with Dr. Stark, the Registrar-General for Scotland, who told him accurately enough that, when the barometer is low, leakage is more frequent. Dr. Stark probably said leakage is greater. The writer of this paper picks up this information, and, altogether misunderstanding it, reproduces it as follows:—"Hence there is often in a room an intermittent smell of gas, perceptible only when *the barometer is low, or, in other words, when the pressure of the atmosphere on the gasholder is so great as to send the fluid through the pipes with perceptibly increased force.*"

We are tempted here to tell the story of another medical gentleman who once complained to us of the inconvenient form of the barometer, and suggested that a shorter tube of larger area would answer the purpose just as well, and be more easy to carry about. These things would not be worth notice, but for the fact that we have just now some hundreds of these gentlemen, very many as ignorant of the laws of nature, let loose on the community in the shape of medical officers of health, with great powers, which may be exercised for good or for evil, and quite as likely for the latter as the former.

But our author's ignorance is not confined to the indications of the barometer. He sees a lying paragraph in a newspaper, and, entirely ignorant of the extent to which a small admixture of atmospheric air reduces the illuminating power of gas, he makes in a note the following statement:—"It is notorious, however, that the gas of the present day is systematically diluted with common air, so that *we do not consume the article we purchase.* This should be made the subject of analysis, and the vendors of it punished as are the vendors of any other adulterated article." The assertion is a ridiculous falsehood; but we must leave our Scottish brethren to deal with the offender.

We have given more space than usual to a publication of this kind, but we cannot refrain from making a few more quotations. "It is appalling," says the writer, "to think that in almost every room, in every house, in every town and city in the kingdom, there exists an agency of such insidious and malignant potency, and that any night, when retiring to rest, an inadvertent turn of a stop-cock may open the gates of illness, and hurl a whole household into eternity before morning." It may be very appalling, but we may ask how many of the 17,000 accidental deaths, which occurred in England alone in 1871, resulted from the use of gas, and how many of these were the consequence of the stupidity of the victims, and what do they all matter when we take into consideration the enormous benefits which a supply of gas confers on the community?

The final recommendations and reflections of the author are much too good to be omitted. The author, we fear, is terribly in earnest, although we notice that his paper was read on the 1st of April. He says:

"Then the whole supply of gas to the dwellings of a city should be shut off at the works—during the whole of daylight. This would withdraw the pressure from within the pipes, and at once lessen by at least one-half the entire leakage into the drains. If our municipal authorities could and would secure this, they would confer an incalculable boon on this and future generations, so far as regards improvement of health; and if, in addition, they would insist on the whole supply being turned off late every night, they would be the means of saving many lives. None of the cases narrated would have been fatal [could they have happened?] had this precaution been used. Street-lamps, laboratories, and workshops might be supplied from a separate system of small pipes."

"But I feel that I am indulging in a vain hope. There are too many vested interests opposed to its realization. All we can do at present, therefore, is to endeavour, by careful supervision and watchfulness, to shut out all chances of exposure to this insidious poison, and to wait for further aid from science. Let us hope that chemistry, from her hidden treasures, may soon unfold to us the cheering beams of a better light by which coal gas will be at once and for ever superseded. This she certainly shall do in time; may it be in our time. May we soon see these fitful flickering flames extinguished for ever, together with their hideous paraphernalia of tubes and tanks, and battered sheds, and blackened chimneys, which deface the outlines of every city, and fill with a pestilential breath their otherwise salubrious neighbourhood. Until this time comes the record will remain unfinished which tells of many poor mortals innocently killed by the inhalation of coal gas."

Parliamentary Intelligence.

HOUSE OF LORDS.

Monday, July 27, 1874.

The Wakefield Water Bill was read the third time, with amendments, passed and sent to the Commons.

Thursday, July 30.

The following Bills received the Royal Assent by commission:—

Ulverston Local Board.
Edinburgh and District Water.
Cupar Water.
Dundee Water.

Public Health.—Reports of the medical officer of the Privy Council and Local Government Board (New Series, No. 2); supplementary report to the Local Government Board on some recent inquiries under the Public Health Act, 1858, with appendix; laid before the House (pursuant to Act); ordered to lie on the table.

SANITARY LAW AMENDMENT BILL.

Lord Walsingham, in moving the second reading of this bill, which had come up from the Commons, said that from 1848 onwards attempts had been made to legislate upon sanitary matters. Several Acts had been passed, of which, perhaps, the first which might be considered of importance was the Act of 1866, but up to 1872 great confusion had existed among the various sanitary authorities in the country. There was a complication of jurisdiction, which was one of the points specially referred for inquiry to the Royal Sanitary Commission. They recommended in their report that the country should be divided into urban and rural sanitary districts, and that one authority only should exercise jurisdiction in each district. In 1872 the Public Health Act was passed, which gave effect to the recommendations of the commission by dividing the country into urban and rural sanitary districts, the urban authorities under the Act being Town Councils, Improvement Commissioners, and Local Boards; in rural districts the authorities being the Boards of Guardians for each union, but guardians representing parishes included in any urban districts were to be excluded from all rural district boards. The Act also provided for the necessary transfer of powers and property which were to accompany this jurisdiction, and conferred upon the Local Government Board certain powers with reference to the constitution of port sanitary authorities and other matters. It dealt with great and varied interests, with details of local administration, with minute and intricate questions of duty and authority, in which a permanently satisfactory arrangement could hardly have been hoped to be arrived at without some further experience, which might enable Parliament to remedy defects, and to condense or to elaborate the system which had been set in motion, according to such necessities as time and observation might indicate. Many questions had arisen, much experience had now been gained, defects had been discovered, and anomalies recognized in the existing law, which it became the duty of the responsible department to remedy and to remove. The Local Government Board had long contemplated a complete consolidation of the sanitary law; but until the general provisions of the law had been ascertained and fixed it was felt that such consolidation would be premature, and the present bill might be considered as only a necessary step towards it. A large number of the provisions in the present bill were therefore merely administrative, and, to some extent, technical. It conferred but few new powers, merely improving, for the most part, the machinery by which the provisions of the old Acts may be carried out, and defining the means by which various authorities are to perform their duties. For these purposes it was proposed by the first 18 clauses to amend the Public Health Act of 1872; by the next 12 clauses to amend the general sanitary law, with regard to the powers and duties of sanitary authorities and the constitution and election of local boards. Seven clauses were then devoted to provisions as to the acquisition of property, powers of borrowing, and the audit of accounts. Some regulations follow, having regard to the institution and confirmation of bye-laws, while the remainder of the Act was devoted to miscellaneous sanitary provisions in connexion with water supply, the prevention of disease, and the sale of unwholesome food. First, in amending the Act of 1872, it removed existing doubts by declaring that the rural sanitary authority and the guardians were the same authority, and that all regulations applicable to guardians should apply to them in both capacities. It further provided that transfers of property held for sanitary purposes should apply to authorities under local Acts, as well as to those under the general law. It also adjusted the incidence of the various rates under which sanitary expenses were to be levied, and provides compensation for officers who might hereafter be deprived of office under its operation. Secondly, in amending the general law, it provides for the payment of expenses incurred by the chief constable in prosecuting offenders in default of the nuisance authority, and enables the Local Government Board to enforce by *mandamus* their orders for the execution of necessary works; giving, moreover, a power to settle disputes between local boards about boundaries of sanitary districts, which are often made the excuse for neglecting important duties. There were, as he had said, very few new powers taken by this bill. It extended the borrowing powers of sanitary authorities, and gave them increased facilities for purchasing easements and rights as well as land and water. It authorized them to recover by summary proceeding the costs of the removal of works. It enabled justices to order the closing of wells and pumps which might be proved to be injurious to health, which was an important new power distinctly recommended by the Sanitary Commission. It enabled sanitary authorities to provide hospitals for infectious diseases and secures means for the removal of patients beyond the limits of their district in cases of emergency. It extended to the metropolis the power to order the destruction of infected clothing, and provided that complaints of nuisances made by persons other than inhabitants of the place where they occurred should be attended to. It granted power to justices to issue warrants to search for unwholesome food, though not exposed for sale, and imposed penalties on lodging-house keepers falsely denying the harbouring of infectious or epidemic diseases. Except in these matters which he had enumerated, the bill was devoted to clearing up doubts as to the interpretation of the old sanitary Acts, and to improving and arranging the machinery provided in them for various purposes. Most of the important clauses had formed the subject of distinct recommendation by the sanitary commission, and the bill had received the cordial assent of both sides of the House of Commons. Its adoption would assist the action of sanitary authorities, and would greatly facilitate the subsequent introduction of a measure for the general consolidation of the law. He begged to move the second reading.

Lord Redesdale was glad to hear that, in the opinion of Her Majesty's Government, the bill was a step towards the consolidation of the sanitary laws, than which nothing was more wanted. He had his doubts that it would tend very much in that direction. It would be one bill the more, in addition to the many others which must be included in any scheme of codification.

Earl Fortescue, having regard to the enlightened views of the present Prime Minister in respect of sanitary matters, was rather disappointed with this measure. He wished that as much time had been devoted to the framing of a sanitary bill as had been spent on the Intoxicating Liquors Bill. But after

what had been said by the noble lord (Lord Walsingham) he hoped they might expect a complete measure next session. In consequence of the influence on the late Cabinet of an old opponent of sanitary reform, who had been eloquent in defence of adulteration, he had not expected much in that way from the predecessors of the present Government. He concurred with his noble friend the Chairman of Committees that nothing was more required than a consolidation of the sanitary laws. The sanitary Acts were numerous, but in some respects practical action in the matter had been of a retrograde character.

The Duke of RICHMOND hoped the noble earl would forgive him if he did not follow him in comment on the Intoxicating Liquors Bill. He quite concurred with his noble friends in thinking that a consolidation of the sanitary laws would be very desirable, but he would not undertake that Her Majesty's Government would prepare a bill having that object during the ensuing recess. He could not think, however, that desirability of a consolidation bill would afford any good reason for not passing this bill. Neither could he concur with his noble friend that the action of the local authorities in respect of sanitary matters had been retrograde. In many localities the local authorities had done much in the cause of sanitary reform.

The bill was then read a second time.

HOUSE OF COMMONS.

TUESDAY, JULY 28, 1874.

PURIFICATION OF THE RIVER LEA.

Mr. READ said the attention of the board had for a considerable time been drawn to the state of the river Lea; and on the 23rd inst. they received a memorial on the subject, in which the circumstance with regard to the dead fish was referred to. The board have for many months past been urging upon the sanitary authority of Tottenham the necessity of completing without delay the works undertaken by them for the deodorization of their sewage, and on the 23rd inst. (the same day on which the memorial was received) the board were informed by the Tottenham Local Board that the new tanks would be put into work at once, and would be steadily at work from that date. The local board also stated that they had settled the preliminary arrangements with a company for treating the sewage, and they trusted that before many weeks elapsed the process would be in operation.

FRIDAY, JULY 31.

WAKEFIELD WATER BILL.—Lords amendments agreed to.

Legal Intelligence.

COURT OF CHANCERY.—THURSDAY, JULY 30.

(*Before the* LORDS JUSTICES.)

STEWART *v.* LUPTON—PATENT GAS SHARES.

This was an appeal from a decision of Vice-Chancellor Malins in a case reported in the JOURNAL of the 21st ult., page 88. The plaintiff sought to recover the value of 10 new shares in the Patent Gas Company, under the circumstances already stated, and the Vice-Chancellor made a decree in his favour. Against that decree the defendant now appealed.

After hearing the appellant's case only, the court delivered the following judgment:—

Lord Justice JAMES: About 3000 years ago it was solemnly proclaimed, "Thou shalt not steal." The defendant has endeavoured to appropriate to himself property which was not his, but which was clearly that of the plaintiff. Beyond all question, when the defendant sold the 10 shares to the plaintiff, and executed the transfer to him, he sold and transferred them with every benefit attached to them, including the option of taking the new shares. Beyond all question the defendant was bound, as an honest man, to give up the 10 new shares to the plaintiff when he was requested to do so; but he has, with a shocking dishonesty, attempted to keep them for himself. The Vice-Chancellor's decree was quite right, and I only regret that the practice of the court does not allow us to give the plaintiff his costs as between solicitor and client. The appeal must be dismissed, with costs.

Lord Justice MELLISH: I am of the same opinion. The present case appears to me to be not at all covered by the decision of the Court of Exchequer, to which we have been referred. The present case is distinguishable from that on two most material grounds. First, in that case the broker of the purchaser was aware from the first of the issue of the new shares. Secondly, the action in that case was not between the purchaser and the vendor, but it was brought by the broker of the purchaser, and such a case would in a court of law depend entirely upon what was the contract. The present is not a case of contract, but the defendant had actually executed a transfer of the shares to the plaintiff before the issue of the new shares was resolved upon. There was some delay in the registration of the transfer, because the plaintiff was in Ireland, and meanwhile the resolution as to the issue of the new shares had been passed. It is said that, by Rule 101 of the Stock Exchange, the new shares, if not claimed by the purchaser within a reasonable time, belong to the vendor; but that rule only shows that if the vendor, in consequence of his name being on the register, gets the option of taking the new shares (and it may be that in the case of large companies, whose transactions are well known, the Stock Exchange might consider that the vendor's broker was not bound to send notice to the purchaser's broker of the option to take new shares)—if the vendor gets the option and does not accept it, and the result is that no one gets the shares, the purchaser is not to be entitled to any damages from the vendor unless he has claimed the option within a reasonable time. In this case the vendor, without giving any notice to the purchaser, took on himself to sell or to renounce or to accept all the new shares which were offered to him in respect of the shares which were registered in his name, including those which he had sold to the plaintiff. Those new shares which the defendant sold must be attributed to his own, not to those which belonged in equity to the plaintiff. The defendant took the last 15 of the new shares himself, and the purchaser was entitled to say, "Ten of those shares are mine." Did he say so within a reasonable time? If he did not, I agree that might be a good reason why he should lose his right. But there was, in truth, no delay at all after he was aware of the issue of the new shares.

THURSDAY, JULY 30.

(*Before Vice-Chancellor* HALL.)

THE LOCAL BOARD OF HYDE *v.* THE HYDE CHEMICAL COMPANY.

Mr. DICKINSON, Q.C., and Mr. BEALE appeared for the plaintiffs; Mr. LINDLEY, Q.C, and Mr KEKEWICH were for the defendants.

The Attorney-General, at the relation of the Local Board of Hyde, was the plaintiff; defendants were an incorporated limited company, originally trading as the Eureka Manure and Chemical Company, and commenced business in October, 1866. They afterwards changed their name to the Hyde Chemical Company, by a special resolution adopted in August, 1868. At first the company engaged in manufacturing products from nightsoil. This created a nuisance, for which the company were indicted at the Chester Assizes in 1866, and found guilty; and, by virtue of that verdict, the company were fined by the Court of Queen's Bench in the sum of £1000, to be reduced to taxed costs if the nuisance was abated before January, 1867. After that the company discontinued the manufacture in which they had previously engaged, and began to manufacture the products of gas tar and other substances. This, it was alleged, only changed the character of the nuisance, and complaints were again made on behalf of the residents to the local board, and by them to the defendants. In 1871 two medical gentlemen inspected the works, and they failed to discover the existence of any noxious vapour. Still it was stated the nuisance existed, and, after representations were made, the defendants agreed to give up the burning of creosote oil, which was alleged to be the cause of all the complaints. This had not, however, diminished the nuisance, and the local board now applied for an injunction.

The case was not discussed, the defendants undertaking to do their best to prevent a nuisance, and giving the plaintiffs liberty to inspect from time to time.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.

At the Weekly Meeting of the Board, on Friday last—Colonel Sir J. HOGG, M.P., in the chair—the Works and General Purposes Committee presented a report, in which they said:—

"Your committee have reconsidered the subject of the appointment of Mr. G. W. Wood as gas examiner at the new testing-station fitted up by the Imperial Gas Company, in Devon's Road, Bow, referred back by the board on the 10th inst. Your committee on the above day recommended the appointment of Mr. Wood to the office, at a salary of £100 per annum; but a question having been raised as to the desirability or otherwise of permitting Mr. Wood to receive this appointment, the duties of which are performed in the evening, in addition to the one which he already holds in the accountant's department, the board referred the matter back to your committee for further consideration. They have now to report that, having carefully reviewed the matter, they fail to perceive any sufficient grounds for withholding the appointment of gas examiner from Mr. Wood, and having in view the satisfactory report which they have received from Mr. Keates, as to his qualifications for the office, they beg to submit the following recommendation:—'That Mr. G. W. Wood be appointed, at a salary of £100 per annum, and subject to the usual conditions, gas examiner at the new testing-station fitted up by the Imperial Gas Company in Devon's Road, Bow.'" The recommendation was agreed to.

The Works and General Purposes Committee made the following further report:—

"Your committee have to report that they have had under consideration the following resolution of the board of the 26th of June last:—'That in the face of the increasing price of gas in the metropolis, and of the fact brought to light by the recent inquiries before the Board of Trade that the main inducements to economy and good management on the part of the gas companies have been taken away by existing enactments, and that practically to obtain a fixed rate of income the companies are permitted to tax the consumers to an unlimited extent, it be referred to the Works and General Purposes Committee to consider and report what steps should be taken either to afford an independent supply of gas in the metropolis, or to initiate some legislative measures to protect the interests of the consumers.' In connexion with this reference your committee have also had before them the several communications from vestries and district boards on the subject of the supply of gas to the metropolis referred by the board in the present year. Your committee would remind the board that from the year 1860 to the present date, numerous Acts of Parliament have been passed dealing with the gas question, and the board have thought it right, in the interests of the consumers, to oppose at considerable expense many of the legislative provisions which have since given so much dissatisfaction. They would also point out to the board with reference to the Board of Trade gas inquiries for 1873 and 1874, that the powers intended to be given to the commissioners of inquiring into due care and management of the companies, have proved to a large extent insufficient for that purpose. It has been sometimes suggested that the board should apply to Parliament for powers to purchase the existing companies, but your committee are of opinion that there are many difficulties in the way of such a proposal, and they are not prepared to advise its adoption. Your committee may, however, remind the board that in the report of Mr. Cardwell's committee in the year 1867 the justice of conceding to the local authorities power to compete in the event of the gas companies declining to accede to such terms as Parliament might think just, is expressly recognized, and is probably the only really effective means which the consumers can use in order to induce the companies to come to terms. Your committee, after devoting much time to the consideration of this important question, have arrived at the conclusion that it is the duty of the board in the interests of the public to promote a measure for enabling the board to provide an independent supply of gas to the metropolis, and they beg to recommend that the solicitor be instructed to prepare a bill to be introduced in the next session of Parliament with that object."

Mr. RICHARDSON (Greenwich), chairman of the committee, moved the adoption of the report. In doing so, he said there had been no question before the board for the last year or so that had attracted a larger amount of public attention than the question of the gas supply of the metropolis. The accounts of the metropolitan gas companies for the past year, which had recently been submitted to Parliament and circulated amongst the members of the board, showed the amount which the metropolis had paid for the supply of gas during 1873, and he could not but confess that he was greatly surprised to find that the amount so paid was as large as £2,544,133. That sum represented the amount paid to the several companies supplying gas to the metropolis during the year 1873, with the exception of two small companies—viz., the Crystal Palace District Gas Company and the Eltham Gas Company. To show the magnitude of the interests involved in this question, he would tell the board that two millions and a half was one-eighth of the amount at which the metropolis was assessed; and, while the Metropolitan Board raised one-fiftieth of the rateable value, the gas companies acquired one-eighth. In 1872 the amount received by the several companies for the supply of gas to the metropolis was £2,133,000; the great advance in the following year being accounted for by the fact of the price of gas being increased by the Board of Trade Commissioners; and, although the price in 1873 was so high, yet it was a fact that the Imperial Gas Company, which had received from the public £684,000 out of that two and a half millions, got permission to raise their price no less than 25 per cent.—*i.e.*, from 3s. 9d. to 4s. 4d. The Gaslight and Coke Company had raised their price from last year by 8d. on 4s. 4d., or 16 per cent., and during the last three years the price of the gas supplied by this company had increased 33¼ per cent. These facts, he thought, showed that the board were bound to look after the interests of the consumers, as opposed to the interests of gas manufacturers, and, after the committee had gone very carefully into the whole question, they found themselves almost unable to arrive at any recommendation, the adoption of which it was to be expected would prove successful. Gas legislation hitherto had taken a course so hostile to the interests of consumers, that they might almost say the question as it stood at the present moment was utterly hopeless unless new legislation took place. The great question, he felt in his mind, was whether or not a 10 per cent. dividend guaranteed by Parliament was a proper return for money invested in the manufacture of gas. He was prepared to maintain that it was not. In his opinion, a dividend even of 6 per cent. would be a proper return; and if the result of the proceedings of the board should be that the gas companies might

be induced to accept a 6 per cent. return, that which was now the cause of so much feeling would terminate, and they would all be in harmony one with another. But the result of the deliberations of the committee was that, having regard to the difficulties in which the board were placed, they could only recommend that the solicitor be instructed to prepare a bill to be introduced in the next session of Parliament to provide an independent supply of gas to the metropolis by the board. Seeing the amount of pressure which had been brought to bear upon the board in reference to this question, that was really the only course the committee could recommend for adoption. With regard to the question of purchase, as stated in the report, the committee were not prepared to recommend the board to undertake it, and he cordially concurred with them in that opinion, seeing the enormous amount which was now received annually by the London companies for the supply of gas—which in all probability would amount in the present year to three millions. In conclusion, he moved—"That the solicitor be instructed to prepare a bill to be introduced in the next session of Parliament to enable the board to provide an independent supply of gas to the metropolis."

Mr. FOWLER (Lambeth) seconded the resolution. He thought it must be patent to every one that any attempt to deal with the gas companies, by means of legislation, would be utterly useless, unless Parliament gave the board powers to afford an independent supply of gas to the metropolis. When the late revision took place, the board saw good to inquire whether the money raised by the companies had been properly expended, and if good management and skill had been exercised, and the commissioners therefore took the opinion of the Law Officers of the Crown, who stated that Parliament gave them no power to inquire into expenditure. Thus the companies were enabled to increase their expenditure without there being any adequate protection for the consumers. The question, therefore, now forced upon the board by public meetings, and by resolutions come to by vestries throughout the metropolis, was, how this could be remedied. He felt that as long as the companies had the power to create stock to pay 10 per cent., there was no chance of the consumers getting any reduction in the price of gas; and that as the companies had got private Acts for supplying the article of which they had unrestricted monopoly, unless the board was prepared to go into competition with these companies, Parliament would not be likely to afford any relief to the consumers, or to give any further powers to the board than they at present possessed. In fact, in 1867, when the Metropolis Gas Act was introduced into the House of Commons by Sir Stafford Northcote, having the support of the corporation of the City of London, as well as that of the Metropolitan Board of Works, legislation failed, and, as was stated by the committee, in consequence of the absence of any bill authorizing the establishment of an independent supply of gas by the local authorities. It appeared to him to be perfectly clear that, unless this board were prepared to go to Parliament and ask for powers to compete with the present gas companies, as those companies had got statutory enactments permitting them to take 10 per cent. on all their capital, without there being any power to go into the question as to whether that capital was properly administered and laid out, it would be useless for the public to expect any relief. He, therefore, supported the motion, in the hope that the board would now go on with the question. There could be no doubt that the Acts of Parliament passed in the last few years, giving one standard price and quality of gas in one district, and another in another district, and allowing one company to raise capital on one set of conditions, and others on other conditions, were a disgrace to the Legislature, as well as a great injustice to the consumers, and should be remedied as speedily as possible. The improvement of the metropolis was in the hands of the Metropolitan Board of Works, and therefore he thought it was the duty of the board to get the law altered, and the only effectual way in which this could be done was as the committee had suggested.

Mr. NEWTON (Mile End) said he regarded the recommendation of the committee as a very proper one. The board must remember that, since the last revision, about which much dissatisfaction had been expressed, a great number of meetings had been held, not only of vestries, but public meetings of the consumers generally, and there had been meetings of delegates from every vestry and district board in the metropolis, for the purpose of considering how to deal with the question; and every one must admit that it was a most difficult matter to deal with, because the companies that were now charging such high prices were acting under private Acts of Parliament, which gave them extensive powers, and which it was very difficult to deal with. The time, however, had now come when something must be done; either the companies must submit to certain restrictions, or they must put up with competition. The committee had carefully avoided recommending a scheme for the purchase of the gas companies works, and he ventured to remind the board that there was a great difference in the circumstances of the case when that proposition was made, and at the present time. Gas shares were now as sure of their dividends as Consols, because the whole of the consumers of the metropolis were at their back; and, considering the necessity that gas had now become in London, they could see at once how effective such a guarantee would be. There were two classes to be considered in dealing with this matter—the shareholders who found the capital, and the consumers who found the dividends. The directors, of course, were acting on behalf of the shareholders, and if they were wasteful and extravagant in their expenditure, the better it was for the shareholders. The consumers, he contended, had a right to a full representation at the boards of directors of gas companies so long as the law remained as it did at the present time. In the last revision, a fact came out with regard to the Imperial Gas Company, which would show at once how the whole thing was managed. At the commencement of 1866 the Imperial Gas Company had debenture loans to the amount of £260,000, upon which they were paying 5 per cent. They possessed the power to substitute for that share capital, if they so thought proper, and they exercised that power by substituting shares upon which 10 per cent. was paid for the debenture loan capital. They, therefore, by that movement, saddled the consumers with an extra payment of 13,000 per annum, without actually raising any additional capital. There was no necessity for this step. They were not in want of capital, and if they were so, why did they not raise it? What was done in that case had been done over and over again by other companies. Nothing could more forcibly show that, as gas companies were at present placed, everything was done in the interests of the shareholders, and nothing in favour of the consumers. The governor of the Imperial Company was very minutely examined upon this transaction by Mr. Cripps, the counsel for the board, and the only answer he condescended to make was, "I am a director of the company, and my duty is to attend to the shareholders. I represent their interests, and I have to see that the company are properly protected." That was all he condescended to say. This plainly showed that the interests of the consumers were not considered by him, and therefore it was that some more efficient control was needed to see whether "due care and management" was exercised over the affairs of the companies. The revision commissioners, in consequence of the opinion given by the Law Officers of the Crown, and guided by their own interpretation of the Act, thought that they were prohibited from going into the question of capital; that the Act of Parliament had enabled the directors of the Imperial Company to carry out that transaction, and as they did it under the authority of the Act, it was not within their power to enter into the question, and decide whether due care and management had been exercised on the occasion. Surely this proved the necessity for further legislation on the subject. He did not think it possible that the board could go to Parliament and ask for a direct alteration of the law in a case of this description; he did, however, think it possible that, if the board went to Parliament and asked for power to manufacture gas at a fair and equitable price, in competition with the companies, they would succeed, and thus destroy their monopoly. The monopoly of the gas companies was of that nature that there was nothing else like it in the kingdom. They were limited, it was true, to a 10 per cent. dividend, and they were exempt from all kind of competition. Railway companies also were limited in their dividends, but they had an enormous amount of competition to contend with. In London there was no competition in gas; but in railway matters there was a healthy competition, and if one wanted to go to Manchester, there were five routes to choose from. In London, competition in gas was specially prohibited: each company had a district assigned them, and seemed to have unlimited authority to charge whatever price was necessary to secure for their shareholders 10 per cent. Now, the mode adopted by the Works Committee, and recommended to the board for adoption that day, was one which had received the sanction of a committee of the House of Commons, before whom this question came. It must be acknowledged that when Mr. Cardwell presided over the Gas Committee in 1868, he did it with great ability. He took a vast amount of pains with the question, and it was then thought that the measures adopted by the committee would be a very great benefit to the metropolis. But he (Mr. Newton) thought that if Lord Cardwell was now watching the progress of the proceedings under the legislation of 1868, he must feel perfectly horrified at the result of his labours. It certainly was not in his lordship's contemplation at that time that things would take the course they had taken. The proper way of dealing with the companies was shadowed forth in the report of the committee on the Metropolis Gas Bill in 1867, when they said:

"However evident and however great may be the advantages of a single supply, under conditions securing to the consumer all that he is entitled to as regards the quality and the price of the article supplied, yet a compulsory and unconditional interference with the prices already conceded to the producer is not the weapon by which Parliament is accustomed to secure the rights of the consumer. The legitimate weapon to be resorted to for that purpose is the enactment of an independent supply; and to that weapon your committee, for the reasons already stated, have been unable to resort."

Then again the committee said:

"It seems to your committee, therefore, that the consumer cannot rely upon the probable introduction of new companies in competition with the powerful organization whose existence has been confirmed by the Act of 1860; and that if the consent of the companies to a proper amendment of that Act cannot be obtained, the proper remedy will be for Parliament to concede to the City of London, the Metropolitan Board of Works, or other local authorities of the respective districts the power of supplying those districts in the manner in which the Corporation of Manchester supplies that city and the surrounding neighbourhood."

"If it shall be urged on the part of the companies that it would be hard to compel them to compete with a public authority, the sufficient answer, in the judgment of your committee, will be that they have brought the competition upon themselves by rejecting reasonable terms, and that it would be unjust to the consumer that he should continue subject to monopoly, and not be provided with the safeguard of effective regulation."

And again—"What terms would, in the judgment of your committee, be satisfactory for the consumer has already sufficiently appeared in an earlier part of this report. Unless the companies are prepared during the recess to consent to such an arrangement, your committee think that every facility should be afforded to the local authorities of the metropolis, in the session of 1868, for the introduction of an independent supply."

Now that was the opinion of the committee presided over by Mr. Cardwell in 1867, and it would be remembered that in consequence of the very strong opinions then expressed, The Gaslight and Coke Company, which were before Parliament in the ensuing session for additional powers and to raise fresh capital, consented to accept the terms laid down, and to fix their maximum price at 3s. 9d. Under these conditions they were entitled to raise their capital at 10 per cent.; but it was expected and hoped that 3s. 9d. would remain the maximum price, and that whenever subsequent revisions took place it would be with a view to still further reductions. But what an altered state of things now prevailed. He had come to the conclusion that there was nothing whatever to prevent the price of gas from being raised periodically, as it had been of late. No effective protection was afforded by the commissioners appointed by the Board of Trade, guarded as their powers were by the Act of Parliament. Nothing but making it the interest of the companies to sell gas at a cheaper rate could be effective. What he proposed would be this—the board should go for their bill, but he did not say that if the companies were prepared to agree to proper restrictions that they should proceed with their bill. All that the board wanted was to see that the consumers were properly and efficiently protected. What he therefore would suggest was, that it should be made the interest of the companies to supply gas at a low price, and that their dividends should be regulated by the price which they charged. Take, for the sake of argument, that gas was supplied at 4s. per 1000, a price which in the present state of things was not extravagant. In his (Mr. Newton's) district gas was now being supplied by the Commercial Company at that price, and in a neighbouring district the Ratcliff Company were supplying at 3s. 9d. For many years past that company had not charged more than 4s., and he was prepared to say that if the Great Central Company had continued their supply as an independent company in the City of London, and had not been amalgamated by the Chartered Company, they would have been supplying gas now at 3s. 9d. But taking 4s. as the proper price at the present time, he would say, so long as the companies charged that price, they should be entitled to take 10 per cent. If they raised the price to 4s. 3d., let their dividends be reduced a half per cent., and for every additional 3d. a further similar reduction. The consequence would be that, if they charged 4s. 3d., they would receive 9½ per cent.; if 4s. 6d., 9 per cent.; if 4s. 9d., 8½ per cent.; if 5s., 8 per cent., and so on. He thought this would be much more effective than relying upon commissioners appointed by the Board of Trade to determine whether due care and management had been exercised in the manufacture of gas. The evidence of the accountant of the board, given before the commissioners, was very instructive to those who would take the trouble to read it. It showed that the moment the companies had the power to raise capital they raised it, and they gave all sorts of encouragement to the shareholders to pay up that capital before the calls were due. He (Mr. Newton) proposed that capital expenditure on works which were not necessary, and not likely to be necessary for some time to come, should not be reckoned as capital entitled to 10 per cent. There would be no inducement for reckless expenditure of capital, or for doing anything to raise the price of gas, if the dividends were reduced *pro rata*. Theshareholders would then look sharp after the directors so as to put a stop to anything likely to reduce the dividends. There was not a railway in the United Kingdom that had not had their dividends reduced in consequence of the high price of iron and coals, which were prime articles with them; but the gas companies were perfectly free from any considerations of that sort. It came out in evidence before the last commission that The Gaslight and Coke Company had made most improvident bargains, in the shape of long contracts for coals, entered into when the price of coals was very high. They knew that their dividend notwithstanding was secure, because of the power to raise the price of gas. In fact, there was no motive for economy; the present state of things opened the door to all sorts of extravagance, because the interests of the companies were not identical with those of the consumers. So long as this continued to be the case, and the whole power and control was in the hands of directors,

the consumers must go to the wall. He thought sufficient had been said to show the absolute necessity for the board to go to Parliament for an amendment of the law so as to place more restrictions upon the companies, and nothing, to his mind, could be so effective as to make the dividends of the companies depend upon the price charged for gas.

Mr. LLOYD (Plumstead) said that, while agreeing very much in the early part of the speech just made, he was exceedingly sorry to hear the latter remarks of Mr. Newton's. He most sincerely hoped that the board were not going to Parliament merely with the idea of frightening the gas companies. Gas had become almost a necessary of life, and on that account it was incumbent on the board to take some action in the matter. It was not so great a necessary as water, but the regulation of the supply of water must come next. With reference to gas, what was the state of affairs at the present time? It had been shown that the gas companies were in a position never to require to be economical. They had no occasion for economy at all. But the worst point was that alluded to by Mr. Newton—viz., that the companies could raise share capital and pay dividends of 10 per cent. upon it to almost any extent, instead of borrowing the money at an average of 4 per cent. He had not much cause for complaint in his own district, but, taking the metropolis generally, it appeared to him that the time had come when private enterprise was antagonistic to public good. The Post-Office and the telegraph had passed into the hands of the Government, and he thought the time had now come for the gas supply to be administered by some central body. He hoped to see a wise measure brought up, and to see it passed into law. He personally had no wish whatever to come to terms with the gas companies, and he trusted that he was not alone in that view.

Mr. FREEMAN (Kensington) said he was not quite sure what the present position of things before the board was—whether they were discussing the report of the committee or the alternative scheme proposed by Mr. Newton; but he must at once remark that, if it was intended that the board should go before Parliament with a bill for power to compete with the companies, supplemented with some alternative plan, he believed the gas companies would simply laugh at them. Any alternative scheme should come from the companies themselves, and not from the board. The duty of the latter was clear, they must go before Parliament with a bill asking distinctly for power to compete with the companies. To discuss any alternative scheme, whatever it might be, indicated no great amount of wisdom on their part. They had, during the last two years, been abundantly supplied with evidence that they were in a very false and unfortunate position; they were bound to take steps to deliver themselves from it, but he warned them that they should count the cost of the great battle upon which they were entering. He urged them to look at it on both sides, and remember that the present state of legislation had been brought about by movements on the part of the public, and of the board and others representing the public. They had drifted into their present position largely from the conduct of gentlemen who had acted on behalf of the public, and had betrayed their interests in the hour of danger. Let it be remembered that if they were going to bring in the proposed bill at the present time there was no Lord Cardwell on their side, they had not the same House of Commons that existed before, and the gas companies were banded together in a distinct and solid phalanx. He hoped that when the board did commence operations, they would arouse every part of the metropolis to petition in favour of their bill, and support it in every possible way. If they did not, they would find themselves involved in the expenditure of a large sum of money without doing any good. There was nothing in the world but public opinion, thoroughly aroused, which would enable the board for one moment successfully to contend against the organization of the joint-stock companies interest in the House of Commons. He hoped, therefore, that the board would resolve upon the bill, and the bill only, without taking up Mr. Newton's alternative scheme. If they entertained that, it would inevitably lead them to defeat, and he, for one, exceedingly regretted that it had ever been mooted in the board. As he said before, any suggestion of the kind must come from the companies; they must be the parties to seek better terms for themselves than the bill of the board would give them—the board must go in distinctly for competition.

Mr. H. L. TAYLOR (City) said he had given this question a little more attention than Mr. Newton had done, and he must confess that he joined with Mr. Freeman and Mr. Lloyd in the regrets they expressed of any intention to show the white feather. He thought there must be no mistake as to the determination of the board, and that determination should be to be satisfied with nothing short of acquiring a distinct power to supply gas themselves. He did not think that, even if the gas companies offered to come to terms with the board with reference to price, they could have any faith in their proposals, for some Act of Parliament by-and-by would be found to enable them to raise the price again. What the board wanted was the entire power in their own hands to do that which he was pleased to say some companies were doing at the present time—viz., to supply gas at a moderate but remunerative price. Why, if the South Metropolitan Company could supply their consumers at 3s., without the incumbrances which some companies had, should not the Metropolitan Board be enabled to supply the consumers of London generally on the same terms?

Mr. FREEMAN: The South Metropolitan Company bought up their plant for a nominal sum.

Mr. TAYLOR said it might be so, and perhaps the Metropolitan Board would be able to do the same. Of course, if they succeeded in inducing Parliament to give them the power to supply, they must have works; but he did not for a moment suppose, if it were seen that they were in a position to enter upon the manufacture of gas, there would be much competition. One party must go to the wall, and therefore the companies might be disposed to let the board have their pipes at a very low price. That was a consequence which might fairly be anticipated. What he wished to enforce at the present moment was that no bill of the board should foreshadow at all the possibility of any arrangement being come to with the present companies. The board must go in with a determination to succeed, and they must let the public know that such was their determination. Even if any arrangement could be made by which the companies would get 8 per cent., it would not answer the purpose of the board. Eight per cent. was too much, and the board would never recoup the outlay. He had no doubt that a very small amount on the mere cost of the works would be sufficient, and he thought the time had arrived when something should be done. As representing the City of London, which was very deeply interested in the supply of gas, he was strongly in favour of the corporation taking up the idea with a view to united action with the board. He sincerely trusted there would be co-operation, and that they would succeed in the interests of the large body of gas consumers to put an end to the present extraordinary monopoly, which almost gave the companies power to take money out of the pockets of the consumers at their pleasure.

Mr. E. D. ROGERS (Camberwell) said he was almost hopeless of any chance of a committee of the House of Commons, even as now constituted, giving a proper solution to this question. He had had many years experience of committees, and he regretted to say that most of them were so manipulated by those in power, and the interests of gas, water, and railway companies were so paramount that, to a large extent, the interests of the public were lost sight of. But he was certain of this, that the board could not help doing something; they must go forward or lose power entirely. They were asked by all parties in the metropolis, who were smarting under existing grievances, to take up the question, and if they did not succeed in obtaining a remedy it would be no fault of theirs. But he could say positively that anything like a compromise at the present time would be a fatal blot. They must be of one mind, and must determinately say that, so far as they possibly could, they would obtain the necessary powers to supply gas themselves. To his mind one of the largest difficulties with which they had to contend was this—Mr. Taylor had referred to the South Metropolitan Company supplying gas at 3s., and Mr. Freeman accounted for it by saying they bought their plant cheap. But he (Mr. Rogers) had yet to learn that that plant could not be now manufactured and made at a cost to give 10 per cent. with gas at 3s. per 1000. He believed it could. That being the case, the main difficulty was this—he did not advocate buying up the companies, and he wished the present shareholders to receive a fair dividend on their investments; but he wanted to take away from the gas companies, as was done with the water companies in 1832, the extra amount of capital not required for their present purposes, and leave them a sufficient sum upon which interest would be paid. There were two main causes for the high price of gas—first, the large amount of capital paid up, and expended in past years upon works which were now exhausted; and, secondly, the large amount of new capital expended upon works which were not productive or remunerative. Of one thing he was certain, that whatever the action of the board might be, they must go forward in this matter on behalf of the consumers, of whose interests they were the custodians.

Mr. SAVAGE (Islington) cordially supported the recommendation of the committee, and complained loudly that the shorthand writer of the board had reported only the first few speeches made upon the subject. The question was a most important one, and it was very desirable that the board should have a permanent record of all the speeches made on this occasion.

The motion was then put and carried *nem. dis.*

ST. PANCRAS VESTRY.

AVERAGE METER SYSTEM TO THE PUBLIC LAMPS.

At the Meeting of this Vestry on Wednesday last, the Rev. Canon THOROLD in the chair—the General Purposes Committee presented the following report:—

1. That your committee have now the pleasure to state that they have completed the arrangements necessary for the commencement of the average meter system for the lighting of the public street-lamps on the 1st of October next. The manufacture and fixing of the meters is being carried out by the contractor, under the supervision of the inspector of lighting, and will, it is hoped, be in full operation on that date.

In drawing this subject to a close, your committee think it will be satisfactory to the vestry to review the proceedings which have led to the adoption of the meter system. At the beginning of the year 1872, the vestry of St. Martin-in-the-Fields, who for a long time have taken a great interest in matters connected with the gas supply to the metropolis, called the attention of the vestry to the necessity for some united action among the vestries and district boards of the metropolis, with a view to secure a cheaper and a better supply of gas to the public lamps. About the same time the vestry of Paddington had their attention drawn to the subject of lighting the public street-lamps by meter. A statement of the results of the average meter system at Uxbridge was issued by the Paddington Vestry, and a copy thereof having been brought under the notice of your committee, the subject was considered. Your committee, however, being of opinion that there were so few points of similarity between the large parish of St. Pancras and the small rural district of Uxbridge, thought that it would not be wise to take any steps upon an experience so limited.

No further action was, therefore, taken until towards the end of 1872, when a notice was received from the Imperial Gas Company to terminate the vestry's contract on the 31st of December of that year. In consequence of this notice, the subject of adopting the meter system was again brought forward, and the vestry-clerk, by the authority of your committee, obtained evidence from various parts of the country where the average meter system had been in operation. From the evidence thus obtained, your committee determined to recommend the vestry to avail themselves of the provision of the Imperial Gas Act, 1869, which provides that the gas for public lighting shall, if required by either party, be ascertained by measurement. Your committee were, however, then of opinion that the best course to be adopted would be to apply the system to not more than 50 lamps, and they recommended the vestry accordingly. Subsequently considerable additional information was obtained, which led your committee to determine that the system which had been tried in various large towns, and found successful, need not be experimented upon in St. Pancras, and more especially as there would be considerable difficulty in carrying out the lighting of a few lamps on the average meter system. They accordingly determined to consider how best to apply the system to the whole of the lamps of the parish.

A sub-committee was appointed, to whom the evidence which had been obtained from various parts of the country was referred, and this sub-committee were authorized to confer with the Imperial Gas Company as to the terms upon which the gas should be supplied, and as to the arrangements for adopting the meter system. The sub-committee, with a view to ascertain how far the existing contract with the Imperial Gas Company was being carried out, instructed the chief surveyor of the vestry to cause several of the governors to be taken from the street-lamps, with a view to test their average consumption. These governors were tested in the presence of Dr. Stevenson and the inspector to the company, at the Imperial Gas-Works at King's Cross, and it appeared from the evidence of these testings that the vestry did not obtain that amount of gas for the public lamps which was contracted for. The inspector of the Imperial Gas Company, at the time of the testing, sent for several of the governors which were attached to the lamps in the neighbourhood, and the testing of these, however, showed that the average was above the amount contracted for; but the committee did not feel justified in adopting this evidence, because those governors taken off under the direction of the chief surveyor had been selected as showing an average flame.

Subsequently the sub-committee met the directors of the company, and a point was raised that metered lamps would not consume so much gas as unmetered lamps, on account of the resistance of the meter to the passage of the gas, and other causes. A series of experiments were made by the Imperial Gas Company, at their works at Fulham, to test the accuracy of this point, and the sub-committee visited the works in order to see the experiments. A statement of the result was afterwards furnished to the committee. Your committee were, however, dissatisfied with the result of these experiments, and as the company had offered to place their apparatus at the disposal of the vestry, Dr. Stevenson was instructed to conduct a series of experiments, on behalf of the vestry, to ascertain whether the company were justified in claiming an allowance in respect of unmetered lamps. The result of these experiments depended considerably upon the weather, and as the deliberations of your committee had then extended to the summer of 1873, Dr. Stevenson found that it would be unsatisfactory to conduct the experiments until colder weather had set in. About the time that Dr. Stevenson's experiments were made—viz., in August, 1873, and before any steps had been taken thereon by the committee, the vestry of Paddington received from the metropolis gas referees a notification of their decision upon several points connected with the average meter system, and in this notification the referees did not acknowledge the necessity for any allowance being made in respect of unmetered lamps. This subject, which had occupied a considerable portion of the time of your committee, was therefore put an end to by the Imperial Gas Company, at the request of your committee, consenting to abide by the decision of the referees.

Shortly afterwards the vestry, upon the recommendation of your committee, determined to adopt the average meter system, and in November of last year

advertisements were issued inviting tenders for the supply of meters, meter-boxes, and for other works in connexion with the system. By the authority of the vestry, your committee engaged the services of Mr. Hartley, C.E., to advise them upon the tenders sent in, and generally as to the form of contract and specification to be adopted for carrying out the works. On the 11th of February, 1874, the tender of the Imperial Meter Company was accepted by the vestry, and a form of contract and specification was approved. At the same time it was determined that an inspector of lighting should be appointed to superintend the carrying out of the contract and of the meter system when completed. Mr. Clutterbuck was appointed inspector of public lighting by the vestry on the 4th of March last.

Mr. Hartley, the consulting engineer, had advised several modifications in the meters and other articles submitted, which the contractors had promised to make before the contract was signed. Considerable delay, however, occurred before approved samples were received, but early in April the contract with the Imperial Meter Company was ready for signature. The company did not then seem prepared to complete the contract, and, after several communications had been made to them, your committee determined, early in May, to recommend the vestry to give notice to the Imperial Meter Company that the signing of the contract could not be further delayed, and that therefore all arrangements with the company must be considered at an end. At the same time your committee recommended that a contract should be entered into with Messrs. Parkinson and Co. for the supply of meters, meter-boxes, governors, &c. This course was approved, and a contract has been duly signed, and the works are being carried out satisfactorily. The contractor is bound to complete the works by Sept. 18 next, under a penalty of £5 per day for every day's default. The arrangements before referred to with the Imperial Meter Company were not only for the supply and fixing of meters, meter-boxes, governors, &c., but also for the maintenance and repair of lamp-posts and for the lighting and extinguishing of the lamps.

In negotiating with the representatives of that company for the terms of the contract, it was felt that considerable difficulty might arise through the lighting and extinguishing not being under the immediate control of the vestry, and when new arrangements were being made the vestry determined, upon the recommendation of your committee, that the contract with Messrs. Parkinson and Co. should not include anything beyond the manufacture, fixing, and maintenance of the meters, meter-boxes, lamp-governors, and cocks; and your committee determined to consider whether it would not be advisable that the vestry should have the control of the lighting, extinguishing, and cleansing of the lamps in their own hands, and that they should have a separate contract for repairing the lamps and lamp-columns, and for the annual painting thereof. After very careful consideration, your committee have determined to recommend this course for adoption, and they have obtained from Mr. Hartley a specification of the works which will be required under a contract for the maintenance and repair of lamps. Mr. Hartley has also reported to your committee upon a series of inquiries which he has made into the cost of lighting in several parts of the metropolis, and has strongly urged upon the committee the desirability of the vestry taking upon themselves the entire control of the lighting, extinguishing, and cleansing. He has also furnished your committee with an approximate estimate of the cost, and from this it would appear that the maintenance and repair of the public lamps under a special contract, and the lighting, extinguishing, and cleansing of lamps by men under the direct control of the vestry, will not entail the expenditure of so large a sum as at present is paid to the Imperial Gas Company for similar work; the estimate for the whole being rather less than 18s. per lamp per annum, whilst the amount paid to the company is 18s. 6d. per lamp per annum.

During the time the committee have been making these arrangements several points of discussion have arisen with the Imperial Gas Company upon the terms of the contract for the supply of gas upon the average meter system, and numerous interviews have taken place between the secretary of the company and the vestry-clerk upon the subject. These points have now all been settled, and the contract finally approved.

One of the most important preliminaries to the adoption of the average meter system, and upon which the time of the inspector of lighting has been almost entirely engaged since his appointment, has been marking on Ordnance sheets the exact positions of all the public lamps in the parish, and preparing a register showing their numbers, and marking those lamps to which meters should be attached. In carrying out this work a considerable amount of labour has been performed. Only about one-half of the detailed Ordnance sheets of the parish are yet completed, the other half being in skeleton. In the detailed sheets the positions of the lamps are shown, but, as many alterations have been made since some of the sheets were published, their positions have had to be corrected in many cases, and 127 lamps were found which were not recorded on the detailed sheets. On the skeleton sheets the lamps were not marked, and the whole of them had to be marked by the inspector. The position of each lamp is shown by the number of the house nearest to it being marked with red ink. Fifty-one new streets which were not shown upon the Ordnance maps have been surveyed and plotted by the inspector—these streets being 4 miles 2 furlongs 36 roods. In 34 cases streets shown on the Ordnance map were not named, and in 28 cases the names of the streets had been altered. Upwards of 45 miles of actual measurement has been made by the inspector in obtaining the information necessary for this plan.

As your committee have now settled the arrangements for taking over the lighting of the parish on the 1st of October next, they have deemed it desirable that from and after that time the Lighting Department of the parish shall be presided over by a committee specially appointed for that purpose, and as it will be necessary for that committee to make many preliminary arrangements before the day upon which the actual work is commenced, your committee are of opinion that such Lighting Committee should be at once appointed. Your committee are also of opinion that as the arrangements up to the present time have been made by a sub-committee of your committee, and as this sub-committee includes gentlemen who have taken a very deep interest in the subject, they recommend that for the present the Lighting Committee shall consist of the members of the Gas Sub-Committee of the General Purposes Committee. Everything is now ready for that committee to commence making their preliminary arrangements, and as soon as appointed it will be desirable that the vestry should refer to them—the contract with the gas company; the contract for the manufacture, fixing, and maintenance of the meters, governors, &c.; the specification for the maintenance and repair of the lamps and lamp-columns, and the annual painting thereof; and the reports of Mr. Hartley on the number of lamplighters and foremen to be employed, and other matters.

And also the committee should be authorized to recommend a tender for the maintenance and repair of lamps, &c., to select the lamplighters and foremen, and to appoint their routes, and to settle the table of the times for lighting and extinguishing, and other details, and to report to the vestry thereon. The committee should be further authorized to purchase ladders, pole-lighters, and other articles required by the lamplighters.

In conclusion, your committee recommend that advertisements be forthwith issued for tenders for the maintenance and repair of the public lamps and lamp-columns, and for the annual painting thereof; and that the Lighting Committee be instructed to recommend a tender for acceptance.

Also that advertisements be issued for 34 lamplighters, the men to be paid at the rate of 22s. per week, and that some of these be appointed as foremen. The additional amount to be paid to foremen to depend upon the number, and not to exceed a total of 26s. per week.

That a committee be appointed to have charge of the lighting of the parish by the average meter system, and that, for the present, that committee shall consist of the following vestrymen, being members of the Gas Sub-Committee of the General Purposes Committee, Messrs. Hoppey, T. C. Jones, Mackaness, Moore, H. O. Nodes, Osmond, Rule, Joseph Smith (Ward 8), and Westacott, and that they have authority to select a tender for the maintenance and repair of lamps, &c., to be submitted to the vestry; and that they also have authority to nominate lamplighters to commence duty on the 1st of October next, to purchase ladders, &c. (Signed) James Hoppey, Chairman.

The whole of the recommendations were adopted.

Report on the gas supplied by the Imperial Company to the vestry of St. Pancras, during the month of July, 1874:—Maximum light estimated by sperm candles, according to the Act—15·3. Minimum light, sperm candles—13·9. Average light, sperm candles—14·1. Traces of ammonia, indicated by turmeric test-paper—traces on all occasions. Traces of sulphuretted hydrogen, indicated by lead test-paper—none at any time. Sulphur 15·76 grains per 100 cubic feet. Illuminating power slightly below that of the preceding month.

Thos. Stevenson.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health on the composition and quality of the metropolitan waters in July, 1874:—

Names of Water Companies.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	16·50	0·073	0·008	0·002	13·0	3·4
West Middlesex	16·37	0·038	0·009	0·001	13·0	3·3
Southwark and Vauxhall	17·00	0·066	0·086	0·002	13·5	3·3
Chelsea	16·63	0·051	0·115	0·001	13·0	3·1
Lambeth	17·17	0·031	0·110	0·001	13·8	3·6
Other Companies.						
Kent	28·17	0·001	0·261	0·000	21·1	5·7
New River	16·80	0·024	0·091	0·000	13·8	3·6
East London	16·77	0·046	0·123	0·001	13·8	3·8

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was more or less turbid—namely, in those of the Grand Junction, the Southwark and Vauxhall, the Chelsea, and the Lambeth Companies. The average quantity of water supplied daily to the metropolis during the preceding month was, according to the returns of the water companies to the Association of Medical Officers of Health, 125,689,091 gallons; and the number of houses supplied was 510,499. This is at the rate of 36·9 gallons per head of the population daily.

Hy. Letheby, M.B.

Dr. Frankland, F.R.S., reports to the Registrar-General, as the result of a chemical examination of the waters supplied to the metropolis during July, that, taking the amount of organic impurity in a given volume of the Kent Company's water as unity, the proportional amount of this impurity in an equal volume of water supplied by each of the other metropolitan companies was—New River, 3·0; West Middlesex, 3·5; Southwark, 4·1; East London, 4·3; Chelsea, 4·7; Lambeth, 4·8; and Grand Junction, 4·9. The Chelsea, Southwark, Lambeth, and New River Companies delivered water which was slightly turbid, and contained living organisms. In the East London Company's water the evidence of previous sewage or animal contamination had been obliterated by long storeage. The water supplied by the Kent Company from deep chalk wells was again "clear, transparent, and wholesome."

The Registrar-General acknowledges the courtesy of the London water companies, who have furnished him with the average daily quantity of water supplied during the month of June, 1874. According to their returns 125,629,083 gallons, or 570,790 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight) were supplied daily; or 248 gallons (112·7 decalitres), rather more than a *ton* by weight, to each house, and 34·9 gallons (15·9 decalitres) to each person, against 33·6 gallons during June, 1873. According to returns of the London water companies made to the select committee on East London Water Bills (session 1867), it is estimated that, during the year 1866, about 82 per cent. of the total supply of water for all purposes was for domestic use. Applying this proportion to the total quantity supplied daily in the month of June, 1874, it may be estimated that about 103,015,851 gallons were used for domestic purposes, or about 28·6 gallons per day for each inhabitant, against 27·5 in the corresponding month of last year. This proportion varies from month to month, but the Registrar-General has no means of giving a more reliable estimate.

Companies.	Number of Houses, &c., supplied in June, 1873.	June, 1874.	Aver. Daily Supply of Water in Gallons* during June, 1873.	June, 1874.
Total supply	504,034	507,571	120,204,176	125,629,086
From Thames	236,267	237,198	62,757,259	64,473,099
„ Lea and other Sources	267,767	270,373	57,446,917	61,155,987
Thames.				
Chelsea	28,270	28,467	8,566,000	8,703,000
West Middlesex	44,810	45,991	10,180,458	10,711,795
Southwark and Vauxhall	79,396	76,679	18,265,468	18,970,500
Grand Junction	34,243	35,144	12,346,633	12,851,404
Lambeth	49,548	50,917	13,398,700	13,736,400
Lea and other Sources.				
New River	121,194	122,134	26,295,000	29,379,000
East London	104,637	105,562	24,095,000	24,541,880
Kent	41,936	42,677	7,056,917	7,235,107

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for June, 1874, as compared with that for the corresponding month of 1873, shows an increase of 3537 houses, and of 5,424,910 gallons of water supplied daily.

The Keymer and Ditchling Gas Company.—The sixth annual report of the directors just issued states:—The accounts show that the amount earned exceeds the expenditure by £27 19s. 6d., and the directors recommend the sum to be carried to the next year's account. The directors regret that the working on the year shows so small a balance, mainly to be attributed to the increased price of coals, 16s. per ton higher, or nearly double as compared with 1871, and 8s. per ton higher than the previous year. They are very hopeful that the accounts for the ensuing year will be more favourable, a larger stock of coals than usual being laid in at 9s. per ton less cost than last year.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

TUESDAY, JULY 14.

(*Continued from page 127.*)

Mr. J. ALEXANDER (Corstorphine) read a paper on

A SELF-ACTING SEAL FOR ASCENSION-PIPES AND IMPROVEMENT SI N HYDRAULIC MAINS.

In none of the departments of the apparatus usually employed in the manufacture and purification of coal gas, and which have been improved in construction and efficiency from time to time, has less change been made or improvement effected than in the one termed the hydraulic main.

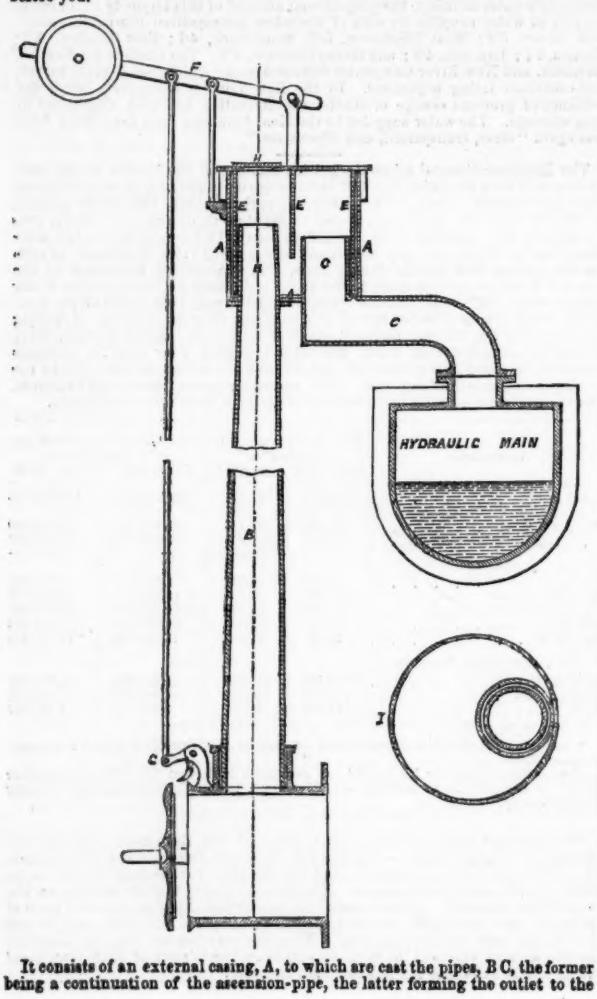
Retorts we have had in variety of shape, size, and material, methods of setting these innumerable, condensers in manifold form and construction, washers, scrubbers, purifiers, and exhausters of many sorts, and even a combined washer and exhauster; but, amid these various changes and improvements, the hydraulic main has remained very much the same, excepting that some one flattens its upper surface, making its section of the D form, affording at once more space for the transmission of the gas and much greater facility for inlet and outlet pipes being connected to it.

The hydraulic main, as used hitherto, has served a twofold purpose—first, in contributing, to some extent, in cleansing the gas from its grosser impurities; and secondly, by its seal preventing a back flow of gas from retorts in action on those in course of being charged. The opinion has for many years been held by some gas engineers of note, that the former of these purposes can be accomplished by an extension of condensing surface or an increase of washing power, while that the latter may be equally well served by other appliances is shown by those inventions now claiming our attention and soliciting our adoption.

The very existence of the hydraulic main, in its present form, seems in jeopardy, for, in the list of subjects suggested to be written upon for our present meeting, the possibility of its being dispensed with altogether is hinted at.

As most of you, doubtless, are more conversant with the details of the inventors above alluded to than I am, a brief reference to their general principles will suffice. In one of these the operation of sealing the dip-pipe during the act of charging the retorts, and unsealing while these are in action, is performed by means of a cup attached to a rod passing through a stuffing-box, by which the former is raised or depressed as required. In another the same results are obtained by elevating or depressing the pipe itself by a similar application of stuffing-box and rod. There are several similar contrivances, to most of which, as to those referred to, the same objection applies, that the rods in the stuffing-boxes are liable to become stiff and hard to work, from the crude state of the gas at this particular stage of its manufacture, the deposit from which renders the use of stop-cocks, ground or conical valves, and slides—in short, all kinds of finished work—all but, if not altogether, impracticable. Besides, these various appliances being inside the hydraulic main, renders them very inaccessible, and their repair extremely difficult should any part get loose, or the rod by which they are actuated become broken. How, in such case, I would ask, is the pipe to be sealed during the repairs required by such derangement? It is in gas engineering, as in military tactics, well to keep an eye on a good retreat.

It seems, moreover, an extravagant waste of space or appliance to occupy nearly one-half of the hydraulic main with tar and water merely for the purpose of filling a cup or sealing a pipe, when the same operation can be performed at less sacrifice of space, at the same time leaving the main quite free for the passage of the gas, and devoting its entire inner surface to the work of condensation. That this may be attained, and some of the objections above obviated, I shall proceed to show, by describing the sectional model now before you.



It consists of an external casing, A, to which are cast the pipes, B C, the former being a continuation of the ascension-pipe, the latter forming the outlet to the main, but considerably shorter, so as to carry off any surplus of tar, &c., from the casing. At E is an inverted cup, or hydraulic valve, in which is cast a central division, extending a sufficient distance from the crown to effect a seal between the pipes, B C, when the valve is lowered. By means of a pin passed through a slot, the valve is attached to the lever, F, from which a rod extends to the bell-crank, G. On the upper edge of the retort-lid is a snig, which is brought against the bell-crank, pressing it back, as the lid is being tightened up, and thus raises the central division of the valve above the water-line, permitting the gas to pass from the pipe B to C.

It will easily be seen that on the removal of the retort-lid the bell-crank is disengaged, the valve drops, and the seal is effected.

At H is a cap or bonnet, which, when the seal is on, may be removed, and the ascension-pipe examined or cleaned out when required. The valve is cast with a small projecting flange or rim round it, to which should be attached a ring of plate iron equivalent in depth to the lift given to the valve, for the purpose of excluding dust, &c., from the water-casing.

By this apparatus the rod and stuffing-box are got quit of, and should any derangement or breakage occur, the valve falls by its own weight, and the seal is on until the necessary repair is made. Besides, it is simple and easy of application to existing ascension-pipes and mains, as there is no need to remove or cut the dip-pipes in the hydraulic mains, but only to make an outlet at its lower diameter, by which its contents may be carried off to the receptacle provided for such impurities.

If applied where two, three, five, or more retorts are set in one oven, the casing may be cast in a piece in the form of an oblong box, with rounded ends, and having divisions cast in it, so that each cell will contain a separate valve covering an ascension and outlet pipe. This arrangement will somewhat increase the area of the casing, and proportionately add to the power of resisting back pressure.

Several objections have been made to this appliance. 1. It will become stiff to work, from the deposit of tar in the casing. Of this there is, I think, less danger than at first sight may appear, for the valve having to be raised and lowered at regular intervals of from three to five hours, will cause, to some extent, an agitation of the liquid, and help in throwing off some portion of the thick material by the outlet-pipe. But should it require to be cleaned out occasionally, say once a year, this operation will not be more formidable than cleaning out the hydraulic main, which, in some gas-works, has annually to be done.

2. How will the thick tar thrown off in the outlet-pipe and main flow from the latter? The tar, as disengaged from the gas, is not so thick as some imagine; it only becomes so by its being retained in the hydraulic main, as in a tar trap, the denser particles falling to the bottom, the more fluid passing off by the usual outlet. To facilitate, however, the discharge of the tar, &c., from the main at the outlet or outlets provided for that purpose, the main can be raised at one end, or, if it is a long one, in the middle, as may be found convenient. It is scarcely necessary to remark that the outlets for the tar must be tapped in in the usual manner to prevent the escape of gas.

3. It has been asked, "How will it do in the case of a choke?" Stripping this query of all disguise, it should be put thus: What amount of pressure, arising from an accumulation of dirt, caused by carelessness, is this apparatus capable of resisting? Obstructions are an abnormal state of things in a gas-work, and are to be guarded against, not provided for. They are not formed in a day, but grow gradually, and are the result, either of defective construction or inattention to these appliances for their detection with which every well regulated works should be freely furnished. Let accurate pressure-gauges be erected at various points in our works, be adjusted at regular periods, say once a week, and frequently examined, and the term "choke" will soon disappear from the retort-house vocabulary.

The model before you is made to the scale of 3 inches to 1 foot, and will withstand a back pressure of 8 inches; but if, instead of the central division, a cap were either cast upon or bolted to the crown of the valve, as shown at I, the power of sustaining a heavy back pressure will be increased. If this cup is made three-quarters of an inch larger than the 4-inch inlet, the pressure will be exerted on the annular space between, having an area of 6·1 inch against 71·7 inch, the area of a casing 12 inches diameter, or, in other words, a depression of nearly 6 inches will have to take place in the annular space to raise the liquid in the casing one half inch.

Supposing the seal to get fixed, only a small quantity of tar can be ejected from the casing, while the gas will escape in an unignited state, whereas, when the hydraulic main g ot unsealed, the gas escaping by ascension-pipe was ignited by the heated ort to the great risk of those near. In some cases the ascension-pipe acted as a syphon, emptying out a large quantity of tar from the main, which catching fire, caused great damage to the retort-house.

Where an exhauster is used the apparatus will have to be constructed of such diameter and depth as to be capable of resisting the pressure, which, despite every precaution, will arise, when any derangement of the driving machinery occurs.

It is asserted by some that by doing away with the seal in hydraulic mains, 10 per cent. more gas, with greater illuminating power, is obtained, a saving in wear and tear effected, by the retorts being freed from the formation of carbon. If such is the fact, and there seems no good reason to doubt it, the sooner some change is made the better. The expense of the improvement will speedily be repaid by the saving effected.

I come now to the second part of this paper, "Improvements in Hydraulic Mains."

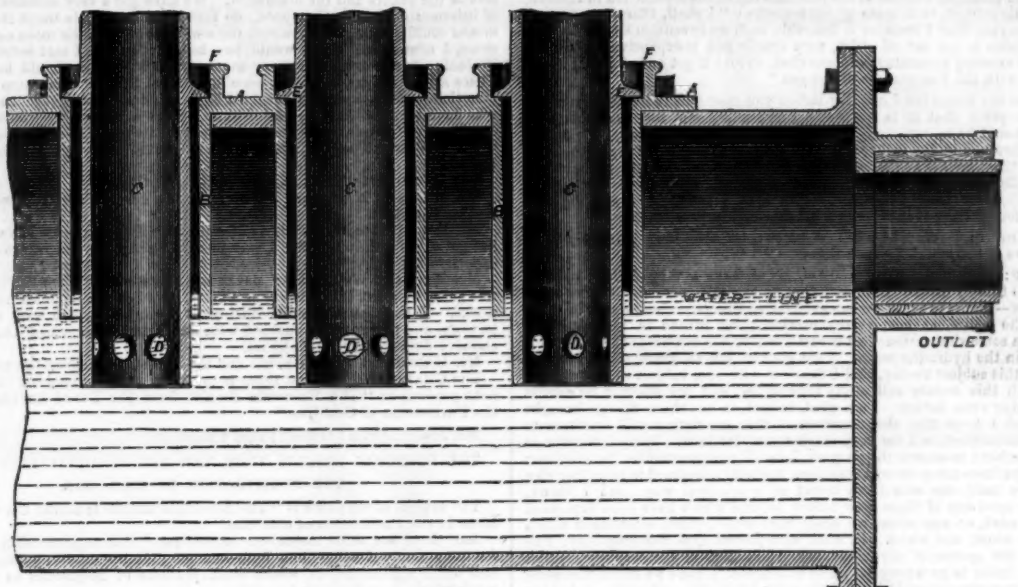
It may appear strange to speak of improving an appliance which the former part of this paper is meant to show may be done without, but what follows may be useful to some who are not as yet prepared to throw aside our time-honoured friend the hydraulic main.

Without further remark, I will now describe the drawing, which is full size, and represents three dip-pipes from three retorts set in on iron, as in use for four years past. A is a flange, having three sockets, B, cast to its under side; this is bolted to the main, the sockets having three-quarters of an inch of seal. Inside these are the dip-pipes, C, with lateral holes, D, for the passage of the gas. These are supported by the projecting snugs, E, which maintain them at the dip of 1½ inch. On the upper side of the flange, A, are cast three shallow faucets, F, for receiving a round or two of soft yarn, to prevent dust entering the space between the pipes, B C. The lateral holes in the dip-pipes are of such size and number as to contain the full area of the pipes, and are bound insuch a position as to prevent all risk of a stream of gas from a retort at work being projected into the dip-pipe of one while being charged, as will be seen by the plan.

The advantages of this arrangement are four—1. Diminished formation of carbon in the retorts. I can only account for this on the principle that less pressure is required to expel the gas from the holes in the side than from the open end of the pipe, the seal in both cases being equal.

It will be found, by experiment, that gas issuing from a pipe under water is in the form of a flattened ball or spheroid, in diameter equal to the bore of the pipe. Before this ball can pass the edge of the pipe and rise to the surface, a considerable portion of it is forced deeper in the water than the dip given to the pipe. More pressure in the retorts will thus be necessary to expel the gas from the end of the pipe than if emitted by the lateral holes.

2. The ascension and bridge pipes can be more easily removed or replaced when either repair or renewal of the bench is required. To effect this it is only necessary to undo the joint at the mouthpiece and lift the pipe out, the end at the main being free in the socket, which will remain sealed by its dip.



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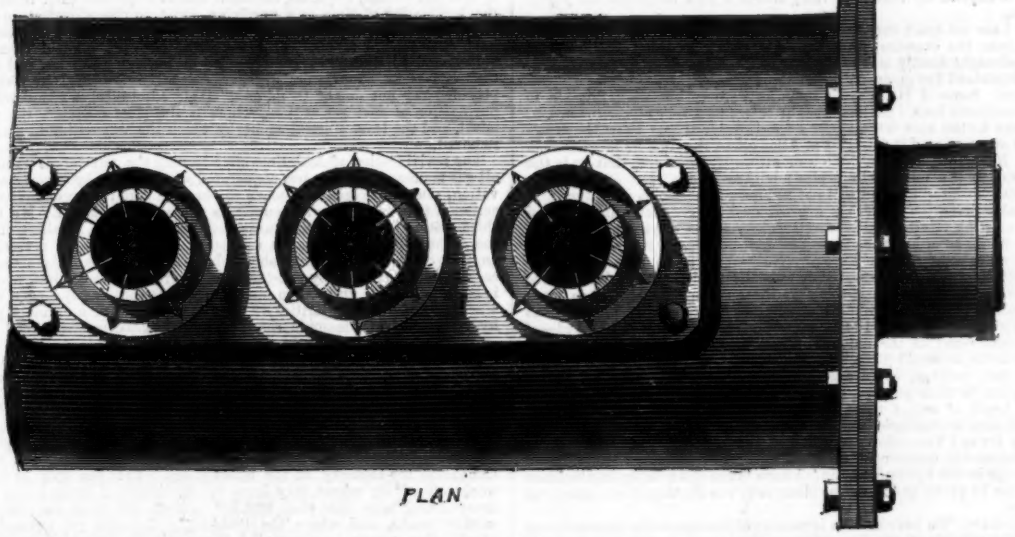


PLAN

3. There are no racked or leaking joints, as the space between the sockets and pipes permits the latter to adapt themselves to any expansion or contraction of the brickwork.

4. In the event of any undue pressure, the seal of the sockets will be formed, thus indicating the state of matters before the gas will be forced down the ascension-pipe or any more serious result supervene. The sockets will not be unsealed by the exhauster unless it is working considerably under zero.

I hope these remarks, if they do no more, may direct the attention of some to the subject, qualified to do it more justice, and be the means of eliciting still further improvements in hydraulic mains. And let improvement not stop here, but extend to other departments, until, combining simplicity and efficiency with correct taste and skilful construction, our gas-works become alike creditable to us as gas managers and good engineers.

The CHAIRMAN said he was sure the members had listened with great pleasure to Mr. Alexander's paper, and he should now be very glad to hear any remarks about it.

Mr. MACRAE said that, as Mr. Boyd had a paper on a similar subject, the better plan would be to defer discussion on Mr. Alexander's paper until Mr. Boyd's was submitted to the meeting. The subjects dealt with by the two papers were kindred.

The suggestion was unanimously agreed to.

Mr. GEORGE BOYD (Alloa) said that, before reading the paper, he might inform the meeting that Messrs. Caffalls and Thomas, of Gracechurch Street, London, had interdicted him, on the ground that they had patented the invention first. That he denied; his was not a copy from theirs, as they said. The date of their specification and application for the patent was Feb. 6, 1874, whereas the certificate which he would ask the secretary to read would show that his invention was prior to that date.

Mr. MACKENZIE accordingly read a document bearing out Mr. Boyd's statement.

The PRESIDENT said Mr. Boyd would excuse him for the interruption, but he was certain that the meeting would not believe that Mr. Boyd had stolen this idea from anybody. It was his own invention, and if some other body in England had invented the same thing, and taken out a patent and forestalled Mr. Boyd, he was sure all the members of the association would sympathize with him, and it would not make his paper any the less acceptable to the meeting.

Mr. BOYD then read his paper on

AN IMPROVED HYDRAULIC DIP-PIPE.

The hydraulic main has engaged my attention for some years past, and my first endeavours were directed to drawing off the tar as it accumulated, leaving the supernatent liquid for the gas to bubble through. My endeavours in that direction have been entirely successful, I am glad to say, by simply placing an intercepting plate of iron across the main, and close to the exit-pipe, I compelled the tar to flow underneath the plate and leave the lighter liquid behind; at the same time I lessened the seal as far as I could with safety—viz., half an inch. I may say that choked pipes have been comparatively a thing of the past since I adopted that method, and the accumulation of carbon in the retorts has never given me any trouble. Having accomplished my purpose in that direction, my next endeavours were directed to do away with the seal of the dip-pipe altogether. It is now considered by gas engineers that the seal in the hydraulic main has more to do with generating carbon in the retorts and chokes in the ascension-pipes than the back pressure from the purifiers and gasholder; and if it can be removed altogether, the gas would be sent into a chamber consisting of the whole length of the hydraulic main and the pipes leading to the purifiers, instead of the confined space represented by the comparatively short pipe between the retort and the hydraulic main. The gas, in this case, would likely be more freely generated, the particles of carbon would have freedom to expand, and a greater yield of gas, with increase of illuminating power and a less production of tar, are results reasonably to be expected, if the seal can be entirely removed. The readers of our valuable paper, the JOURNAL OF GAS LIGHTING, must be familiar with the numerous schemes which have lately been brought forward to accomplish this end, but with two exceptions they are all worked by means of a stuffing-box, and no doubt you are all aware that with such a temperature as exists in the ascension-pipe these stuffing-boxes would be likely to give an immense deal of trouble, and be very fruitful of leakage, even although asbestos, the substance our worthy president has successfully used for sealing his retort-lids, were employed.

The improved dip-pipe I now bring under your notice obviates the use of a stuffing-box altogether, and is so simple in its construction that it will never be liable to get out of order. The ordinary dip-pipe is cut off about 1¼ inch above the water-line of the main, and a conical seat is turned in it, into which a corresponding piece of pipe is fitted, which I have named a hollow plug. Across the bottom of this hollow plug I attach a kneed bridge-plate, into which the ¼-inch rod for working the plug is screwed, and into the bonnet of the H-pipe I fix, with two jam nuts, a 1-inch malleable iron tube, dipping into the liquid to a depth corresponding to the low end of the hollow plug when into its seat. The ¼-inch rod, which is attached to the hollow plug, works inside the 1-inch iron tube, the top end of the rod being attached by a linked joint to the short arm of a weighted lever, which keeps the hollow plug to its seat. Every part works freely, and there is no friction on the plug-rod, so that it is hardly possible for the apparatus to go out of order. Another important point is that it can be fitted easily to existing dip-pipes, and at a comparatively trifling cost. I had the improved dip-pipe at work for about two months, and it gave every satisfaction. One great advantage is that, should the stoker omit to open the valve after closing the retort, no accident can happen, nor can the retort suffer any damage, as in that position it is nothing more nor less than an ordinary dip-pipe. I notice

that Mr. Livesey, the past president of the British Association of Gas Managers, in his able and practical address at the late meeting of the association in London, alluding to this subject, thus sums up his remarks: "I shall, therefore, content myself with saying that I consider it desirable such an invention should be self-acting, not liable to get out of order, very simple and inexpensive, capable of adaptation to existing apparatus, and one that, should it get out of order, would not interfere with the free passage of the gas."

I think that the invention I now lay before you meets all these requirements, with the exception that it is not self-acting; and I am not sure that it is desirable it should be so, especially if got at by sacrificing simplicity. I lay my invention before you in the full conviction that it will remove many of the evils attendant on that stage of the manufacture of gas which lies between the retort and the purifier; and should it meet your approval, I shall consider myself amply rewarded for the time and trouble I have taken in modifying and altering it before getting it into its present thoroughly practical form."*

The PRESIDENT: Having heard both papers, we shall now be very glad to have the views of the members upon them.

Mr. HISLOP: In common with many others, I have a very decided opinion with regard to this hydraulic main, and that is, the sooner it can be done away with the better—that is to say, if we can get a better thing to substitute for it. I am strongly in the belief, as our worthy president has hinted in his admirable address, that a somewhat serious loss is sustained by the discharge of gas through tarry matter in the hydraulic main. I am glad to see so much talent brought to bear upon this subject to-day, and I think it will be a subject that every one connected with this society will study thoroughly, and try whether he cannot devise something even better. I am glad, indeed, to see these things brought before us, and I hope that the members of this association will continue to investigate this subject, as I am very much interested in it. Indeed, so soon as I can see something to answer the purpose, I should at once consider its adoption; but now-a-days there are so many inventions, that one is inclined to be rather shy of new things until one sees them tested in a practical way; and I think, whether it be upon one of those now before us, and which have been explained in the papers read, or any other, we shall have some system established which we can safely adopt, and which will work with perfect ease and simplicity. The advantage of the system of my friend, Mr. Alexander, of Corstorphine, is that all parts of it liable to go wrong are quite accessible. I have no doubt that some very simple arrangement could be made to work efficiently, and without choking up for a considerable period of time. If it could be made so as only to require cleaning out once a year, that would be a very small matter. Before sitting down, I wish to express my thanks to the gentlemen who have read the papers on the subject.

Mr. REID: I am not quite sure that I quite understand the last paper. I am sitting so far from the drawings that I cannot recognize them distinctly. I think Mr. Boyd might kindly make reference to the diagram on the wall.

Mr. BOYD explained the diagram.

Mr. PEBBLES: Some of Mr. Boyd's remarks were rather unintelligible to some of the gentlemen here. He has brought before us a very clever invention, at which I know he has been working for a considerable time. I saw the drawings of it last summer, and it was cast at Alloa about the time he mentioned—the middle of November, I think. We can all testify and agree that he is the original inventor of this improved dip-pipe; but, so far as I can learn, he has been served with an interdict, and will not be allowed to use his invention. It is a very valuable invention; there is a great deal of simplicity about it and adaptation to existing retorts, and it is well worthy of our attention.

Mr. ROBB: While according the greatest amount of ingenuity to these things, I sometimes wonder what good they are for. No doubt they are beautiful inventions, quite sufficient for the purpose, but do we really require them? Would it be worth the expense and trouble? If those gentlemen who had devoted so much time and attention to it had given us any figures to go by, or have given us some calculations, as it were, of the amount of money that would be saved—of coals and of labour—and of the amount of gas made more than we have been accustomed to make, it would have been important. The inventions are beautiful enough, and, perhaps, could overcome the difficulties spoken of. They may be very good for their purpose, but I have been a gas manager for 30 years, and I never heard of any of these difficulties. These inventions, I have no doubt, are sufficient to overcome the evils spoken of, but, so far as I am concerned, and so far as I know the gas-works of the country—and I have been through a considerable number of them—I never heard people complain very much of stoppage in the hydraulic main. I have taken down an hydraulic main after using it for 14 years, and it was as clean as it was the day it was taken out of the foundry.

Mr. MACGILVRAY: We have had the ingenuity of this invention discussed, and we have had the validity of the invention spoken about, and the need why it should be adopted. I for my part cannot see that it could be a safe thing; however, others may see differently. As far as pitch in the hydraulic main is concerned, I have never had any experience of that; as to the removal of the seal, there is no great advantage to be derived from that. The gentlemen who have read the papers deserve our most hearty thanks for the pains they have taken in bringing the matters forward, but I think it comes to be a matter as yet to be proved by statistics, as to whether it is actually required or not.

Mr. WHIMSTER: If the seal is withdrawn from the hydraulic main, and the gas allowed to pass freely into that main, will it not deposit thick tar on the inside of the main, and just put the evil farther away from you, and into a place where there is no reaching it? You will observe that this invention of Mr. Boyd's is simply a portion of the lower part of the dip-pipe made moveable. Well, we all know that, in practical working, tar forms in very considerable quantities on the inside of the dip-pipe, so much so that it chokes it up altogether sometimes. This tar will drip down while the cup is lowered into the main; when the retorts are being charged there will be an escape of gas, and if the pipes are not accurately jointed, the gas will pass between the ends of the pipes, and along the bridge-pipe, and down to the retort. There is another evil, and a greater evil. Where exhausters are used, and where, especially, perhaps half an inch of vacuum is allowed, a great many of the retorts will be out of action continually; if the junction between the two pipes is not properly formed, air will be drawn in from the upper portion into the hydraulic main. I think that is the real evil, and a great evil. I like this cup, this seal of Mr. Alexander's, better; but there is also an evil connected with it. I formed a seal of this kind 14 years ago, but I found that the tar thickened—in fact, it formed into pitch, and became so solid that the cup was immoveable.

Mr. MACRAE: These models and drawings and discussions are all very good, but I am afraid we rather overlook the evil in trying to find out a cure through other sources than where it exists. It will be known to every gas manager, who has looked into the matter, that sometimes he will have a man who will have his pipes choked three times a day, and that with the same oven and the same everything else, but with a different man, you will work for weeks and never have a choked pipe. Well, if we find it to be the man who is the cause, we should try to remedy and improve the man. Bad stoking and bad firing have something to do with choked ascension-pipes. We should try to find out if there is not some remedy in better manipulation.

Mr. MACPHERSON: The disadvantage I see in all systems of doing away with seal in the hydraulic main is, that if the retort is leaky or has a hole in it, the gas will pass from the hydraulic main through the retort, or if an exhauster is at work air will be drawn in.

* We gave a description of this invention, with illustrative drawings, in the JOURNAL for June 30, p. 907.

The PRESIDENT: We must all have listened with a very great deal of interest to the papers and the discussion. We have got a very considerable amount of information from both papers. So far as I can see, I do think if some simple means could be adopted by which the seal in the hydraulic main could be overcome, I cannot see but it would be a benefit; but, as I said before, I think it is absolutely necessary, whatever means are adopted, it should be self-acting. There are objections, as have been stated, but I think this is a step in the right direction, and I am sure we must all be deeply indebted to the two gentlemen who have brought the subject before us. It is a matter we would do well to consider carefully as to whether or not any benefit would be derived from it.

Mr. MACPHERSON: Perhaps Mr. Macrae would give us his experience about bad stoking.

The PRESIDENT: That is a very good suggestion.

Mr. MACRAE: Next year; but Mr. Macpherson just knows as well what bad stoking is as I do.

Mr. MACPHERSON: There is a difference of opinion in regard to what stoking has got to do with it at all. I was merely asking Mr. Macrae to give us his experience.

Mr. MACRAE: Well, I have never been in a retort when the carbonization was going on; but I do know that what I stated does take place in every gas-works. I have seen choking during 24 hours when men were in charge of an oven, and there was no choking with the same oven when the men were changed during the next 24 hours.

Mr. MACPHERSON: You would find that without changing the men.

The CHAIRMAN: The best thing is to have a paper on choking of pipes. The next paper is on "The Economic Results from the Use of Revivified Lime in the Purification of Coal Gas."

Mr. JOSEPH GIBB (Armagh) read a paper on

THE ECONOMIC RESULTS FROM THE USE OF REVIVIFIED LIME IN THE PURIFICATION OF COAL GAS.

The subject of my paper is "The Economic Results from the Use of Revivified Lime in the Purification of Coal Gas."

But there are other impurities in coal gas which require a different process for their removal other than lime—namely, the condenser, washer, scrubber, and other appliances, in which such portions of impurities as are held in mechanical suspension are deposited.

The impurities that still remain are found to consist of ammonia, sulphuretted hydrogen, and carbonic acid gas. These impurities exist in different proportions in coal and cannel, requiring chemical means to perfect their removal. Hence the application of lime as a purifying agent in the manufacture of coal gas, both in a wet and dry state. And, although a great variety of other substances have been tried, and many of them abandoned, yet some of them have been very beneficial, and have greatly aided in purifying the gas, and in removing the unpleasant odour from gas-works and the localities in which they are placed. Yet not one of them, as a single substance, so completely effects the purification of coal gas as lime, which is the most effective, the most economical, and the least hurtful agent by which the impurities in coal gas can be removed.

The revivification of foul lime after leaving the purifiers is no new thing, as all gas managers more or less acquainted with it, both by experience and observation, must have seen that when the heap of foul lime remains exposed to the action of the atmosphere it assumes its natural colour again. Mr. Clegg, in his third edition, on the manufacture of coal gas, page 196, speaking of the impurities of foul lime, says "that it consists of an admixture of several salts. The analysis of these compounds shows that more than half the mass consists of carbonate of lime, nearly one-fourth of hydrosulphate of lime, about one-fifth is hydrate of lime unacted on, and the residue contains cyanogen salts and the siliceous and other impurities in the limestone, with a variable proportion of hydrosulphate of ammonia retained in the mass mechanically, causing the offensive odour emitted on exposure to the atmosphere."

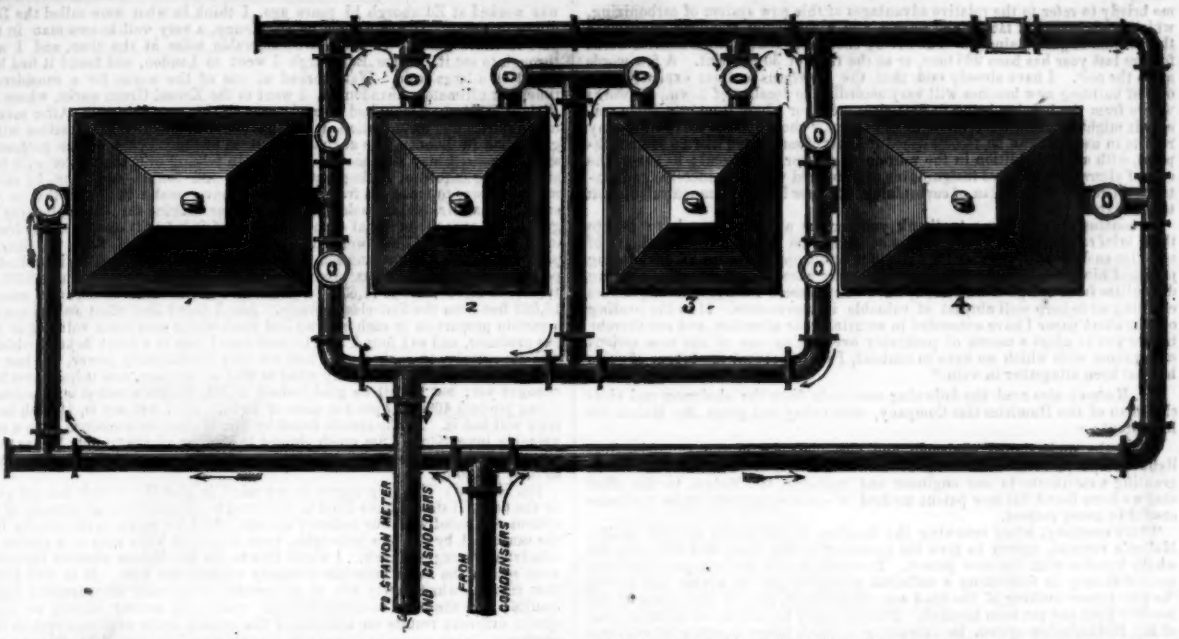
So that, under these circumstances, it is only where gas companies who are not under restrictions, as regards the offensive odour from the foul lime, that the use of the revivified lime can be used as a purifying agent. I for one have no restrictions, and am at liberty to use the lime, after being revivified, without giving offence. Other plans have been adopted to revivify the foul lime without removing the lime from the purifier, by an arrangement of pipes, forcing the atmospheric air through the foul lime in the purifiers, and carrying the effluvia to the chimney of the retort-house. This can only be done in gas-works effectively where they have the appliances of steam power (and I have never heard why this plan was not carried out more successfully) but in smaller works, and where the steam-engine has not yet entered, they must adopt other means to accomplish the same ends, for which size of works this paper is chiefly intended.

I am not aware of any gas manager having taken the advantage of using the revivified lime again in their purifiers as a purifying agent, and hence my reason in bringing this subject before the Association of Gas Managers. And if any have adopted the same, or a better plan, I hope that the details of the process I am following will forward the more general use of revivified lime.

It is now ten years since I began to carry out this arrangement, and the year before I began, my lime account was £29 per annum, to purify about 7 million cubic feet of gas, or 3·97 farthings per 1000; and the next year, in following out my arrangements, the lime account was reduced to £18, showing a saving of £11, or about 40 per cent. My lime account for last year was only £26, to purify 11 million cubic feet of gas, or 2·27 farthings per 1000, or 43 per cent. saving.

The process I adopt in revivifying the foul lime after it leaves the purifier is, first, to spread it thin on the floor of the purifying or lime shed, and in ten hours or so to turn it over again on the flat; then, after other ten hours, to put it up in drills forming a triangle, giving more surface to the atmospheric air, and taking up less space; then, after some time, dividing the drills again a second time by making others of the same kind, by which means all the lime has been exposed to the atmosphere and revivified. The time taken in turning the lime is less than one hour altogether for one purifier. The length of time the lime requires for revivification is about two days, but the person who has the charge of this process will soon learn what is necessary to be done with a little practice. But before putting the revivified lime again into the purifiers it requires to be damped with water, the same as if it was new lime. Care must be taken that no water is allowed to fall upon the foul lime during its revivification, as the water prevents the evaporation process.

I shall now give a description of how I use the lime in the different purifiers, and I have brought a bird's-eye sketch of their position. They are four in number, the larger 7 feet by 5 feet, and the smaller 5 feet by 5 feet, and 3 feet 6 inches deep, and I have numbered them so that the process may be easier understood. They are so arranged that two of them can be worked together, or each one separately. The coloured arrows show the flow of the gas to and from each purifier, the black arrows showing the flow of the foul gas from the condenser, &c., into Nos. 1 and 4; the blue arrows showing the flow of gas from Nos. 1 and 4 into Nos. 2 and 3; and the red arrows showing the flow of gas from all the purifiers on its way to the station-meter and gasholders. You will observe by the blue arrows that I can use Nos. 2 and 3 alternately with either of the purifiers, Nos. 1 and 4. Sometimes I run short of revivified lime, and have to soil two of the smaller purifiers, which contain *only* new lime, to give me sufficient revivified lime to fill Nos. 1 and 4. Let me here state that Nos. 1 and 4 are always filled with revivified lime, and *never* with new lime,



and Nos. 2 and 3 are always filled with new lime, which purifiers are tested with the acetate of lead on moist paper; and, as soon as it shows the least taint on the test-paper, the gas is turned on to the two clean purifiers. I may also state that the lime taken from Nos. 1 and 4 is totally unfit for revivification again, and is sold to farmers as a manure; while the offensive odour from the foul lime taken from Nos. 2 and 3 purifiers is very little, compared with the odour from Nos. 1 and 4.

The PRESIDENT: This is certainly a subject which contains a good deal of novelty as to the application of lime, and I shall be very glad to hear observations from any gentleman about it.

Mr. GORE (London) referred to some experiments made in London some years ago, but which, by circumstances, were prevented from being carried into practical effect. He proceeded to say: The experiments of the gentleman whose paper we have heard read goes to show that gas managers may make use of their material to very useful purposes by revivifying the lime as it comes out of the purifiers. If it should be found out to be so, it will set at rest for the future a great question now agitating the gas world—to my mind very foolishly—about the quantity of sulphur that may be burned in private houses. I think too much fuss is made about the quantity of sulphur found in the gas. I can most honestly commend to your consideration the important question which that paper has brought before you. Depend upon it, as your president has observed, the success of a gas manager, and of gas management, depends on the attention bestowed on details. Complete and thorough attention to these small details may produce such a perfect system as will materially forward the progress of gas lighting.

Mr. HISLOP: In large works, where large quantities of purifying material are employed, it becomes a serious matter to see so much valuable material thrown away after having only once passed through the purifiers, without more thoroughly exhausting it. One charge is not sufficient, according to the area, which is in practice to thoroughly exhaust that lime. We require a considerable time for chemical action and combination, and, therefore, in the absence of that, we have meantime to look for some means of revivifying this lime. I have made some experiments upon this subject, but not in the way indicated by Mr. Gibb. I commenced with some of the larger blocks, and burned it with coke in the usual way, and the results were upon the whole very successful. The difficulty was how to recalcine the small portions of the lime, and, in order to remove this difficulty, I got a quantity of lime passed through a pan mill, by which the lime was broken down in order to give it consistency, and render it easily moulded into bricks and introduced into the kiln in the usual way. The process so far entirely satisfied me; the bricks were well formed, and in a way that they could be handled and placed again into the kiln. I am still engaged on the process, and have been for some time, and am, therefore, not in a position to give you particulars as to the results obtained, but I have a hope that this method will be carried out ultimately quite successfully. It is only by recalcination that we can again restore the lime to its former condition.

Mr. MACPHERSON: Perhaps Mr. Gibb would inform us whether the purifiers were the same area before as after.

Mr. GIBB: The very same; the one was much larger than the other. I had small ones at first. The same principle can be adopted in any of the works, no matter how large they be.

Mr. MACPHERSON: Did you increase your purifying area?

Mr. GIBB: I only wrought two of them, as formerly.

In reply to a question by Mr. MACRAE,

Mr. GIBB stated that there was no additional labour required. One hour would revivify the one purifier; one hour was quite sufficient, so that it incurred no additional expense whatever.

Some other questions were put as to the additional expense which would be involved where a large number of men were employed, but the PRESIDENT ruled that these were questions there was no data to go upon.

The PRESIDENT: We must all feel the importance of this subject, at all events; and if any means can be got by which lime can be revivified, it would tend very much to reduce the cost of purification. I confess that, to my mind, the paper does not carry that conviction which I should like it to have done. I do not know how long Mr. Gibb has had this process in operation.

Mr. GIBB: For 10 years. It is not a new thing at all; I have spoken about it for many a year.

The PRESIDENT: If it has been in operation for 10 years without being so much as heard of, it shows the advantages of such associations as this. The only doubt, to my mind, is this: whether Mr. Gibb would have had the same results if he had left his lime lying in the purifier. It is a matter which I think is worth experimenting on, and it is a matter which is very easily tried. It is well worth trying to know what it is worth, and perhaps by next meeting some of us may have tried what we can do. In the meantime, I move a hearty vote of thanks to Mr. Gibb. We will now take the next paper, which is by Mr. Malam (Dumfries), and which will be read by Mr. Nelson.

Mr. NELSON said: There was a probability that Mr. Malam would not be able to be present, and I wrote to him. I have a note from him this morning, in which he says he has a deputation of two gentlemen from Marseilles to inspect his patent, and he might have to go over there.

Mr. D. M. NELSON (Glasgow) then read a paper by Mr. A. Malam (Dumfries) on

STOPPAGES IN ASCENSION AND OTHER PIPES: THEIR CAUSES, REMEDIES, AND RELATIVE ADVANTAGES.

In making the following brief remarks upon the subject which I have selected, I need not point out how annoying and vexatious it is to have from time to time stoppages occurring in ascension and other pipes, independent of the loss occasioned by the consequent interruption in the working.

The chief cause of stoppages in the ascension and other pipes is, as we all well know, the adherence to the inside of the pipes of the highly decomposed hydrocarbons which are carried forward by the gas, and whenever, from any cause arising, our heats have been increased.

That high heats are indispensable if we wish to extract from coal the full amount of gas contained therein, has, for a long time, been by all practical men an acknowledged fact; but how are we to maintain the full degree of heat necessary, and at the same time avoid making the mouthpiece and ascension-pipe too hot, thus producing that condition most favourable for the adhesion of the carbonaceous deposit already referred to, the result being a complete stoppage.

After a long series of experiments made by myself on the works of the Dumfries Gaslight Company, I succeeded in perfecting an invention, which I patented, by which I was, and still am, enabled to use the strongest heats that can be obtained, and set choking at defiance.

How, you will ask, is this accomplished? and I answer, By the aid of an efficient, though simple and inexpensive, appliance. The novel arrangements which constitute the most important part of my invention consist in keeping the ascension-pipe and mouthpiece comparatively cool. A trough is formed on the mouthpiece, embracing the lower end of the ascension-pipe, which is kept constantly filled with water, supplied from a circle of jets at the top of the ascension-pipe, flowing down the outside. Additional assistance is afforded by a continuous spray of water down the interior of the ascension-pipe and through the mouthpiece, which condenses and washes the gas, at the same time carrying down the undecomposed hydrocarbons and earthy matters.

In order that the principle and details of the invention may be thoroughly understood, allow me to refer you to an examination of the model and drawing, which I herewith exhibit.

Independent of the advantages to be derived from the non-liability to choking, my plan, in point of efficiency and saving, has proved immensely successful. The improvement, though carried out in the practical manufacture of gas, was necessarily at first crude and inefficient, but I was encouraged to persevere, believing, as I did, that millions upon millions of feet of gas were throughout the country being wasted by being left in the tar, from our inability to take it out. Keenly alive to their own interests, as all directors of public companies should be, the directors of the Dumfries Gaslight Company watched these experiments, and, when fully convinced by practical results affecting in no slight degree the prosperity of the company, as shown by the balance-sheet, they caused the whole of the benches to be rebuilt on my improved plan, and double-ended retorts adopted, so as to enable the charging to be accomplished with the best results, and without in the least interfering with the improved mouthpiece. This is undoubtedly the best form of retort to work, as it admits the leaving at the end thereof, nearest the improved mouthpice, a quantity of incandescent coke or brick, over which the crude gas is made to pass, just before entering the mouthpiece. Hydrocarbons, which would go to form tar, are here caught and decomposed, and a considerable addition made to the volume of the gas. The tar, in consequence of the highly destructive nature of the carbonization, aided by the peculiar treatment which the crude gas is forced to undergo, is, according to Dr. Stevenson Macadam, of little value, except in the manufacture of pitch, all the light hydrocarbons having been converted into illuminating gas. In the experience of others, whose system of carbonizing tar and converting the hydrocarbons therein, contained in the permanent gas, the formation of naphthaline has generally accompanied the destructive process; in this process those heavy hydrocarbons, which go to form naphthaline, are at once converted into the gaseous state, and prevented from depositing themselves as tar, or as earthy salts, oftentimes found in the syphons and other parts of the apparatus of the works.

I have remarked to you that the experiments were at first crude, but, convinced that the principle was sound, I went on experimenting by actual working until I reached the perfection of what I now produce. This was not a work of a few weeks or months, for I have been engaged for years in perfecting these improvements, determined, before submitting them to the scientific world, to thoroughly search, and see if an element of failure or anything calculated to mislead existed in either principle or detail.

Having endeavoured to account for the principal cause of stoppages in the ascension and other pipes, and pointed out a thoroughly reliable remedy, permit

me briefly to refer to the relative advantages of this new system of carbonizing, which are a saving of labour and retorts, and a somewhat startling addition to the volume of gas obtainable. The saving effected in coal at the Dumfries works for the last year has been 986 tons, or at the rate of 30 per cent. A few words as to the cost. I have already said that the apparatus was not expensive, the cost of building new benches will vary according to locality of town. In works where from the benches being in first-class order, or where from particular reasons it might be deemed advisable to add the new mouthpieces to the fire-clay retorts in use, this can be accomplished at a cost of something like £3 per mouthpiece, with a large addition in the volume of gas per ton of coal; however, the cost of alterations becomes insignificant as compared with the increased advantages arising from this plan of carbonizing, nor does it require much calculation to make this apparent.

In conclusion, permit me to thank you for the attention you have paid to these brief remarks, and to express my sense of the value and importance of societies such as this, the meetings of which afford opportunities of exchanging practical hints, ideas, and experiences which are exceedingly valuable, clearing difficulties from our path which may have been deemed insurmountable, besides enabling us to keep well abreast of valuable improvements. If in the reading of this short paper I have succeeded in securing your attention, and can thereby induce you to adopt a means of profitably overcoming one of the most serious annoyances with which we have to contend, I shall feel that the labour of years has not been altogether in vain.*

Mr. NELSON also read the following certificate from the chairman and vice-chairman of the Dumfries Gas Company, which they had given Mr. Malam for his patent:—

"We, the undersigned, chairman and vice-chairman of the Dumfries Gaslight Company, after conferring with the directors, have much pleasure in granting a certificate to our engineer and manager, Mr. Malam, to the effect that we have found his new patent method of carbonizing coal to be most successful in every respect.

"This company, when renewing the benches on the works in 1873, at Mr. Malam's request, agreed to give his invention a fair trial, and fitted up the whole benches with his new patent. Previous to this the company had very great difficulty in furnishing a sufficient supply of gas in winter, but during the past season nothing of the kind was experienced, and, in fact, some of the benches have not yet been kindled. This can only be attributed to the success of Mr. Malam's new system in extracting a much larger quantity of gas from the coal.

"The directors find the result of the year's working to be a saving of 986 tons of coal, being equal to 30 per cent. as compared with the previous year, under the ordinary method of working, a saving which has enabled them to declare their usual dividend, which otherwise, looking to the high price of coal, they could not have done.

"The directors of the Dumfries Gaslight Company have therefore pleasure in recommending the adoption of Mr. Malam's patent."

The PRESIDENT invited discussion, whereupon a member stated that, seeing Mr. Malam was not present, it would be unfair to criticize his statement very severely.

Mr. NELSON: Though not posted up as Mr. Malam is, I am quite prepared to answer any question in a general way. There is no man in the gas world more anxious to invite criticism than Mr. Malam, and any question I am unable to answer he shall reply to through the JOURNAL OF GAS LIGHTING.

The PRESIDENT: Mr. Malam would be very much disappointed did his absence prevent criticism.

Mr. MACRAE: Can Mr. Nelson tell us if this has been in use for a longer time than last year? We have got comparisons of the difference of the quantity of coal used, and a certificate from the chairman and vice-chairman of the company, without telling us whether the gas has been reduced or not. I think I saw this working at Dumfries two years ago. If that was working the previous year, it is not quite fair not to give us figures. I am certain I saw them working two years ago.

Mr. NELSON: I may tell you that Mr. Macrae has just asked exactly what I stated in the paper. I tell you that, although only adopted during the last year, Mr. Malam has yet been working upon this matter for years, and in all likelihood Mr. Macrae could see an experimental retort erected according to this plan. The retorts, in so far as Mr. Malam's paper is concerned, have only been in use for practical and profitable purposes for 12 months. Mr. Malam, I may mention, has been using all sorts of coal, because, from the pugnacious nature of that gentleman, he would not leave a stone unturned to make the thing a success.

Mr. MACRAE: I saw these retorts in Dumfries works two years ago. I noticed that Mr. Malam had stated that he took 4000 cubic feet of gas from every ton of coal more than any other man. He says in his paper he takes 13,000 feet. I think the statement about the 4000 feet should be publicly contradicted. If he does take out 4000 feet more than any other body, he must have taken 15,000 feet. He must prove that he has taken out more than 15,000 feet, or admit that he has not taken 4000 feet more than any other man, because I know men who can take 11,000 feet.

Mr. PEEBLES: Are we not drifting away from the subject altogether?

The PRESIDENT: Yes, that is quite true; but in the paper there is a great deal of matter introduced. If you notice, it was stated in the paper that, while Mr. Malam's object was to prevent stoppages in ascension-pipes, his plan was also to produce the effect of giving a very much larger yield of gas. If he could get 30 per cent. more gas out of every ton of coal, it is very clear that this is the most important point in the paper by a long way.

Mr. PEEBLES asked for information about the coal used.

Mr. NELSON: With reference to the coal used by Mr. Malam, he has been using Newcastle cannel, I think, judging from the quantity of gas he says he takes from it. He formerly took 8000, now he takes 11,000. Taking Scotch cannel, he formerly took 11,000, now he takes 14,000, and, I believe, close upon 15,000, and takes 4000 feet more than could be done by the old method of working. Mr. Nelson then read an extract from Dr. Muspratt, to show that this authority prophesied exactly what Mr. Malam was trying to bring to pass.

Mr. PEEBLES: I do not say a word against Mr. Malam's invention. I think he has done a very clever thing, and he seems to give very excellent results. But it would have made it more intelligible to us if we had had the comparisons and explanations which would have made us thoroughly understand and believe in the process. We have been told of this enormous produce of gas, but we have heard of none of the defects which must be inherent to the system. There must be some defects, but we have heard nothing about them.

Mr. GORE asked whether the charging of the retorts took place at the one end and the gas escaped at the other end.

The PRESIDENT replied that it was so.

Mr. GORE said, if Mr. Malam had been present, he would have asked him in what respect his plan differed from that of Mr. Webster. He pointed out that the extra quantity of gas might not be an extra quantity of light or illuminating power.

Mr. WHIMSTER: I would not be disposed to risk the charge of picking faults in this invention, but I trust any remark I may make will not be regarded in the light of fault-finding. I simply want information as my brother managers do. Mr. Gore has asked in what respect this invention differs from Mr. Webster's, and some of us here are old enough to remember Basford's patent. It was worked at Edinburgh 15 years ago. I think in what were called the Duddingston works. It was worked by Dr. Young, a very well-known man in that part of the country. It made a considerable noise at the time, and I went through to see it. From Edinburgh I went to London, and found it had been tested on a large scale. Was worked at one of the works for a considerable time, but ultimately abandoned. I went to the Kensal Green works, where Mr. Wright, a Glasgow man, had erected works on this very principle. After making my inquiries and examination, I had an opportunity of a conversation with a gentleman in London who at that time stood at the very top of the profession, and, perhaps, I may say, he does so still. In talking over the matter with him, and making inquiries, stating my difficulties and doubts, and so on, he said to me, "If I was to make gas from tar I would never make tar," and this is just exactly what Mr. Malam is doing. He is never making tar; he is allowing the gas to pass over the material to make the gas of it before it reaches the hydraulic main at all. Well, I sat working at this after my return from my tour. I produced 9000 feet of gas from common coal. At that time I noted the illuminating power and quantity of gas produced per ton of coal. I went on to 9500, to 10,500, to 11,000, and to 11,500. I got that. I tried other coals, and I reached 15,000 feet from the first-class cannels. And I found that when we had reached a certain proportion in each coal we had reached the maximum value of it as a gas producer, and so I found that in each case I rose to a point beyond which it was unprofitable to go, because I lost not only illuminating power, but lost tar, fuel, and labour. I made up my mind to that at the time, and it has never been changed yet; but I shall be glad indeed if Mr. Malam's patent is a success, if it can produce 4000 feet per ton more of light. All I will say is, if such be so, time will test it. If the results found by Mr. Malam are sustained, it is a most valuable invention. I am much obliged to him for all the trouble he has taken in producing this fine model exhibited on the table, and in bringing the subject so fully before us.

Mr. HISLOP: The only regret to my mind is that Mr. Malam has not given us the data. I should have liked to have had to ascertain the advantages of this system compared with our ordinary system. Had he given us the results from the same coal by the two principles, then we would have seen at a glance the relative advantages of each. I would like to ask Mr. Nelson whether the retorts were set on the same principle formerly as they are now. It is well known that retorts, when newly set, at all events, as as rule, they produce higher results; and there are so many different systems of setting retorts, we might obtain different results on account of the higher heats with one system than another.

Mr. WHIMSTER: My remarks would indicate that I did not regard this invention as a new thing. I would refer you to an article in the JOURNAL OF GAS LIGHTING of Nov. 10, 1855, where you will see this very principle most distinctly and definitely enunciated.

Mr. MACPHERSON: It appears to me the same thing could be effected without all this apparatus, by merely using high heats and light charges.

Mr. JOHN REID: I am very much inclined to think the same way as expressed by Mr. Whimster. The subject is one of the very greatest importance, and it strikes me if attention was paid to the working out of the results of Mr. Malam's invention, and carefully noted statistics taken of the general results, it would prove to our next meeting a most interesting communication. In the present state of our information on the subject we are not yet able to form a very decided opinion about it.

Mr. NELSON replied. He could not, he said, go minutely into the question of coal used by Mr. Malam. It was a question with him of using different coals at different times, as all gas managers do. He was not to be tied down to any particular method; he used the coal he knows is best adapted to his arrangements. He explained the model on the table, and added that there was no diminution in the illuminating power more than formerly, and Mr. Malam maintained the illuminating value, and took a greater amount of gas from the coal than he ever did before.

The CHAIRMAN said this was a very startling result, and was well worth the attention of everybody engaged in the manufacture of gas. A thing like this should not be treated lightly, because Mr. Malam might have got the proper method in doing this particular thing; and if it can be done, it would be a great advantage to gas manufacturers. I hope that at our next meeting, in Dundee, Mr. Malam will be able to give us some further figures. In the meantime, you will join with me in according him a hearty of thanks for bringing the subject before us as he has done.

Mr. MACRAE suggested that at next meeting the association should request Mr. Malam to give them the data for his results, to give a proper comparison, information about the coals, about the setting, and about the illuminating power, so that the matter might be laid in a business-like way before practical men.

Mr. NELSON mentioned that Mr. Malam just two days ago finished his balance-sheet for his directors, and had not had time to prepare the information Mr. Macrae had asked for; but he was sure Mr. Malam would do so in the course of a few days.

DONATION TO THE ASSOCIATION.

The PRESIDENT intimated that a gentleman in the meeting, who did not wish his name mentioned, had offered a prize of £5 for the best paper upon the subject brought forward by Mr. Malam, and embracing the several points which had been considered.

Mr. PEEBLES suggested the propriety of getting a medal cast, so as to obviate the difficulty when a gentleman declined to take a money prize.

Mr. NELSON read a paper on

A NEW FORM OF SLIDE-VALVE PUMP,

SPECIALLY ADAPTED FOR HEAVY OR THICK TAR, ETC.

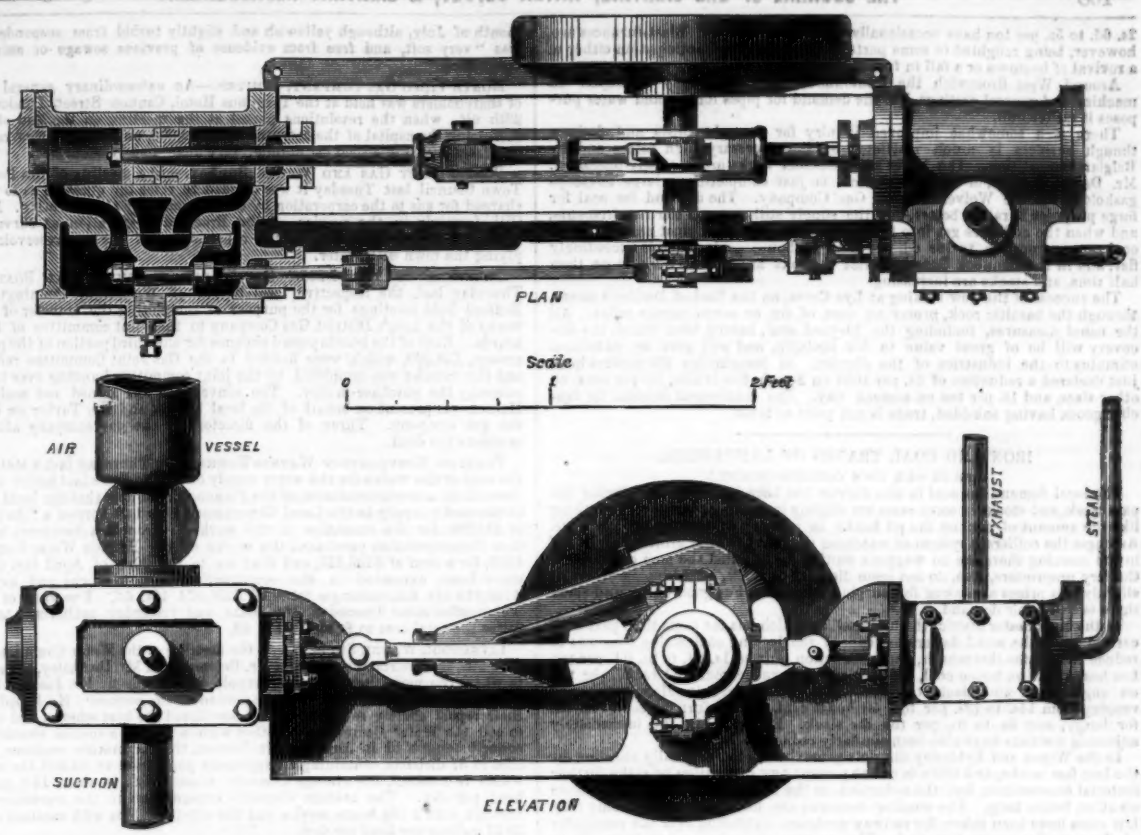
To avoid occupying too much of your time with a detailed description of this machine, I submit for the inspection of the members of this association and others interested, a pump made and fitted together for use, also diagrams, showing plan and elevation, each of which I hope you will examine during the course of the day.

This machine is of a kind and construction *essentially* different from anything at present in use for pumping purposes. It is the invention of, and patented by, Mr. Worth, an engineer in the north of England, and has been designed to meet the long felt but hitherto never satisfied desire for a perfectly reliable machine.

As you will at once observe from the drawings, the distinguishing feature of "Worth's Patent *Slide*-Valve Pump" is the absence of *clack*-valves, generally a source of great annoyance from their liability to cease working when exposed to grit, dirt, or chips, commonly found in tar and other liquids. Briefly stated, the principle of this pump consists in the substitution of a slide-valve for the four clack-valves usually employed in a double acting force-pump. It is constructed so as to give a large bearing surface, in order to render it durable, and is moved by an eccentric keyed on to a crank-shaft. By this arrangement the passages to and from the pump-barrel are compelled to open and close at the proper time, without any of the uncertainty which always attends the common clack; and, as a further result, the pump is always reliable. Besides being made with the steam cylinder attached as shown, these pumps are adapted to work off any revolving shaft either by crank or eccentric, also single as well as double acting.

The peculiar construction of this valve renders a description of it rather difficult; yet it may be made somewhat plain to you if I say that it is similar to the kind used for steam, were that form of valve worked on the *back* of the main slide.

* An illustrated description of this invention is given in the JOURNAL for April 15, 1873, vol. xxii., p. 324.



The inventor having experimented with many other kinds, including ordinary slide and piston valves, found all to be useless after short use. The form now brought under your notice has been in use for a considerable time in various gas and chemical works, and in every instance with entire success.

To mention one instance, where I was an eye-witness of its capability, may strengthen the evidence I offer on its behalf. In a chemical work belonging to Dr. Sadler, Middlesborough, there are seven of these pumps in active operation, doing varied hard and continuous work well calculated to test their merits. Especially would I refer to two of these seven (No. 1 size) that are employed pumping anthracine. At times this stuff is so thick towards the bottom that the men have to use shovels to keep it forward to the suction-pipe. Another (of size C) is employed to pump tar, and the quantity of cinders and other foreign matter mixed with the tar and pumped into the stills by this peculiar form of slide-valve would astonish any one accustomed only to the ordinary clack-valve pump.

For general work, such as in breweries and on board ship, this pump is of special value.

One feature connected with its manufacture will commend itself to engineers, that of the pump-bed being bored for the glands and turned at the ends to receive the cylinder at *one* operation; the cylinders, therefore, only require to be slipped on these turned ends and bolted there to be absolutely true one with the other. This simple method, while it ensures the utmost accuracy in fitting together, enables the makers to supply a first-class machine at a moderate price.

For the convenience of those who cannot inspect the pump just now, our president has kindly permitted me to place it on the corporation premises, 29, Alston Street, where all interested may have an opportunity of examining it.

With the opportunity thus afforded, I will not trespass further on your time, but conclude by thanking you for the attention you have given me.

Mr. Nelson was thanked for his paper.

Mr. Reid called attention to the importance of the diagrams being made larger, so that they could be made out more easily. Several gentlemen approved of the suggestion, and, while thanking the gentlemen for their fine drawings, expressed the hope that at future meetings the hint would be attended to.

The Late Mr. G. F. Cuiter, of Dalkeith.

Mr. Reid made a fitting reference to the loss the association had sustained by the death of Mr. Cusiter, of Dalkeith, who, he said, was a young man of very great promise, and, as a manager of a gas-work in a small country town, signalized himself by very extraordinary talents. He thought it proper to take this notice of their esteemed friend.

On the motion of the President, it was unanimously agreed to record on the minutes of the association the sense of the members feelings with reference to Mr. Cusiter, and to send an extract of the minute to his family.

Vote of Thanks to the Chairman.

On the motion of Mr. Reid, who spoke in highly eulogistic terms of the address given by the president, and expressed the hope that it would be printed and put into the hands of the members, a hearty vote of thanks was given to Mr. Foulis for his excellent management of the meeting.

Mr. Foulis acknowledged the compliment, and said that, though he had little spare time, he would always find pleasure in doing what he could to promote the welfare of the association.

The meeting then adjourned to meet again at five o'clock in the same place.

Worcester New Gaslight Company.—The general ordinary meeting of this company was held on Friday last, Josiah Stallard, Esq., chairman, presiding. The secretary read the report of the directors, and also a statement of the general affairs of the company, which were considered very satisfactory. The proposal made by the Town Council to purchase the works was negatived with one dissentient. The usual dividend at the rate of 10 per cent. per annum was declared. It was also announced that there would be a reduction of 3d. per 1000 cubic feet in the price of gas from the 1st of July. This, with the re-appointment of directors and an auditor, was the chief business; and after a vote of thanks to the chairman and directors, the shareholders inspected the works.

IRON AND COAL TRADES OF SHEFFIELD, NORTH DERBYSHIRE AND SOUTH YORKSHIRE.

(from our own correspondent.)

It is with much pleasure that I chronicle the termination of the great strike of miners in this district. On Monday and Tuesday they resumed work at the Shibley Colliery (Dronfield), the Holmes Colliery, Low Ground Colliery, the Roundwood pit, at Staveley Collieries, Aldwarke Main, Carhouse Colliery, the Fence Colliery (Aston), and several other large pits in the district. On Thursday afternoon a further meeting of delegates was held at Barnsley. The secretaries of the association were not present, but 53 delegates put in appearance. After a conference with the district committee, a resolution was passed recommending the immediate resumption of work at all the collieries now standing, on the terms agreed to at the Doncaster meeting on the 10th inst. These terms are a reduction of 10 per cent. in wages, the further 2½ per cent. to be submitted to arbitration. It is thus assumed that the strike is at an end, and that work will be resumed on Monday at the 25 collieries where the men are still out on strike.

During the past week or so several of the foundries, finished iron-works, and steel-works have been put to considerable inconvenience, owing to the difficulty experienced in getting a sufficient supply of coke. This, however, will now cease, and in a week or two there should be a corresponding reduction in the price of fuel. Coke is still nominally held at 25s. to 27s. for Durham, and 22s. to 25s. for local hard-washed. Gas coke is quoted at 16s. 8d. per ton by the Sheffield United Gaslight Company. The foundries are in most instances doing a fairly good stroke of business on pipes and general castings, and the Sheffield and Rotherham brass-works are still experiencing a healthy call for engine-brasses, taps, hydrants, plumbers fittings, and the usual run of brass-foundry.

The new rules and regulations for the water supply of Leeds, made by the corporation, just issued, lay down the following weights for the various sizes of lead communication-pipes:—½ in., 6 lbs. per yard; ½ in., 7 lbs.; ⅝ in., 9 lbs.; ¾ in., 11 lbs.; 1 in., 13 lbs.; 1¼ in., 21 lbs.; 1½ in., 26 lbs.; and 2 in., 38 lbs. per yard. These are similar to those authorized by the Sheffield Water-Works Company. All joints must be wiped or plumbing ones, and there are sundry rules as to the position, depth, &c., of pipes, with others as to cocks, underground cisterns, and so on.

At a meeting of the local board of Handsworth, on Wednesday last, it was decided to see Mr. Ayris, the distribution engineer of the Sheffield Water Company, as to the supply of the district with water, the local springs and other sources being insufficient.

Water-works for the supply of the town are shortly to be commenced at Ripley, Derbyshire.

The Midland Railway Company is about to construct a small reservoir at Sheffield for their own water supply.

Several large gasholder-tanks are about to be constructed at the Corporation Gas-Works, Dewsbury.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(from our own correspondent.)

A decidedly better inquiry for finished iron has prevailed during the past few days, the demand for sheets being especially brisk owing chiefly to the lowness of stocks, and to the somewhat improved request for galvanized roofing sheets on account of the colonial markets. Prices are still maintained owing to the high value of fuel and labour, sales having been rather freely effected on the basis of £12 for marked bars; it is evident that buyers have withheld specifications as long as their requirements will permit, all the orders now placed being urgent and for immediate delivery. The makers of second class, unbranded iron, have, in some instances, accepted contracts on the standard of £10 for bars, but that is quite the minimum, £11 being the average ruling price. The leading firms maintain that present prices are unremunerative, and that nothing short of an early and substantial reduction in the price of fuel will impart any degree of soundness to the trade. Stocks of pig iron are, in some cases, accumulating, notwithstanding the limited make, and reduction of from

2s. 6d. to 5s. per ton have occasionally been submitted to. Blast-furnaces are, however, being relighted in some parts of the district, in anticipation either of a revival of business or a fall in fuel.

Around West Bromwich the ironfounders are moderately employed on machine and general castings, but the demand for pipes for gas and water purposes is rather dull.

There is a somewhat improved inquiry for wrought tubes and fittings, though business is much restricted by the necessary high prices and by Belgian competition. The boiler and gasholder works are in steady operation. Mr. Daniel Howard, of West Bromwich, is just completing a large telescope gasholder for the Wolverhampton Gas Company. The demand for coal for forge purposes is rather better, but the supply still exceeds the requirements, and when the collieries get into full operation a reduction must ensue. Forge coal ranges from 13s. to 18s. 6d. per ton. In house coals trade is exceedingly flat, and in the Cannock Chase district the pits are not at work more than half time, and stocks are increasing.

The success of the new sinking at Lye Cross, on the Earl of Dudley's estate, through the basaltic rock, *proves* an area of six or seven square miles. All the usual measures, including the 10-yard coal, having been found, the discovery will be of great value to his lordship, and will give an additional stimulus to the industries of the district. At Stourbridge the makers have just declared a reduction of 5s. per 1000 on 9-inch fire-bricks, 10 per cent. on other sizes, and 1s. per ton on cement clay. The continental demand for fire-clay goods having subsided, trade is not quite so brisk.

IRON AND COAL TRADES OF LANCASHIRE.

(FROM OUR OWN CORRESPONDENT.)

The local demand for coal in this district has been generally dull during the past week, and stocks in some cases are slightly increasing; but there is nothing like the amount of coal on the pit banks as is usual at this time of the year. Amongst the colliers a system of watching the pits has been established, and if in the morning there are no waggons waiting to be filled the men cease work. Colliery proprietors, also, do not seem disposed to stock, and shipping orders at slightly less prices are taken for surplus supplies. For good burgy and slack there is still a fair demand.

In the Manchester district the underselling which has for some time past been carried on by the small dealers has caused the leading coalowning concerns to reduce their rates this month, and a reduction of from 1s. 8d. to 2s. 6d. per ton has been made on house coal, 10d. per ton on furnace coal, and 1s. 8d. per ton on engine fuel and slack, the list prices for delivery in Manchester now ranging from 14s. to 18s. per ton for house coal, 14s. for furnace coal, 10s. 6d. for burgy, and 8s. to 9s. per ton for slack. Pit prices in the immediately adjoining districts have also been similarly reduced.

In the Wigan and Tyldesley districts prices have been gradually receding for the last few weeks, and there is not at present any disposition to make further material concessions; but the reduction in the Manchester market must have an effect before long. The smaller concerns are underselling, and some very low rates have been taken for railway contracts extending over the remainder of the year for locomotive fuel. The average pit prices range from 15s. to 15s. 6d. for Arley Mine coal, 13s. per ton for ordinary house coal, 11s. to 10s. for common ditto, 8s. to 9s. for burgy, and 6s. to 7s. 6d. for slack.

For gas coal there has been a fairly steady demand, but business is not brisk. The majority of the contracts have now been placed, and many of the colliery proprietors have entered into all the contracts they are prepared to accept this year. The average contract prices for screened gas coal are 12s. to 14s. per ton, and for gas cannel, from 30s. to 35s., but the price of the latter description varies considerably according to quality.

The coke trade continues quiet. Lancashire makes have, in some cases, been reduced 2s. 6d. per ton this month, and Durham foundry coke, delivered here, is also easier to buy.

In the iron trade there has been a steady improvement, but business is not particularly brisk. For pig iron, both foundry and forge descriptions, there has been a fair demand, and prices are firmer; No. 3 foundry iron, for guaranteed immediate delivery, is quoted at 81s. 3d. per ton, and forge numbers at from 66s. 6d. to 70s. per ton; but, for forward delivery, considerably less prices are taken. In manufactured iron there has been some improvement, but prices are rather irregular. Ordinary bars are quoted at about £9 15s. per ton; rails, light sections, £9 10s.; heavy do., £8 10s., delivered.

Most of the local iron-works are now receiving more work, and forge proprietors, founders, engineers, and machinists are fairly employed.

COAL AND GENERAL TRADE OF THE NORTH.

(FROM OUR OWN CORRESPONDENT.)

The prospect of the close of the South Yorkshire colliers strike had a tendency to check any extra demand for Durham and Northumberland coals last week; and though business could not be described as dull, it was a trifle less buoyant than the week before. The falling off in demand, though it was not very great, was the most perceptible in the best qualities of steam, household, and gas coals. There was little inquiry for second-class gas coals, but the downward tendency of prices of manufacturing coals is checked. A limited coasting business was done. There were the same complaints of a want of little coasting vessels last week, as upon the two or three weeks preceding. Quotations were—London, 6s. 6d.; Pool, 7.; Yarmouth, 5s. 3d. per ton; and to the French ports £9 to £9 10s. per keel. The pits are working very steadily.

The finished iron trade is better, and the prices of all kinds of castings are tolerably steady. The chemical trade of the Tyne showed symptions of improvement last week, and there was a slight rise of prices. A good business is doing in fire-clay goods, and the shipments coastwise and to the Continent are very satisfactory. Timber has maintained its price during the past month, and it is not likely to get lower in the autumn. Cement and other materials used in building are sold at a reasonable price, and they are more plentiful in the market.

At a meeting of the Tynemouth Town Council, held on Friday, after a warm debate it was resolved, by ten votes to seven, to adjourn the consideration of the purchase of the water-works *sine die*.

CONSTANTINOPLE WATER SUPPLY.—A telegram from Constantinople states that an Imperial decree has been issued granting to Kramil Bey and Ernan Bey the concession of the Constantinople water supply, and approving the statutes of the company to carry out the works.

NEWCASTLE (STAFFORDSHIRE) GAS COMPANY.—The annual meeting of this company was held on Wednesday last, when the accounts were submitted and passed, and dividends of 10 per cent. on the old shares and 7½ on the new were declared.

VALPARAISO WATER-WORKS COMPANY, LIMITED.—Vice-Chancellor Malins has authorized a further dividend of 5s. in the pound to the creditors of this company, making 20s. in the pound, payable to-morrow, at the offices of Mr. Frederick Maynard, the official liquidator.

BIRMINGHAM WATER SUPPLY.—Dr. Hill, the medical officer of health for Birmingham, reports that the water supply of that town during July, although pretty clear, had a "distinct brownish-green tinge," and that its proportion of organic nitrogen continued very high.

GLASGOW WATER SUPPLY.—Professor Bischof, of the Andersonian University, reports that the water supply of that city, drawn from Loch Katrine, during the month of July, although yellowish and slightly turbid from suspended matter, was "very soft, and free from evidence of previous sewage or animal contamination."

MONTE VIDEO GAS COMPANY, LIMITED.—An extraordinary general meeting of shareholders was held at the Terminus Hotel, Cannon Street, London, on the 28th ult., when the resolutions passed at the meeting on the 2nd of July for increasing the capital of the company by £100,000, and the directors remuneration from £1000 to £1500 per annum, were unanimously confirmed.

PONTEFRACT GAS AND WATER SUPPLY.—At a meeting of the Pontefract Town Council last Tuesday it was decided to refer the question as to the price charged for gas to the corporation by the gas company to arbitration. Mr. John Gill, formerly in the service of the Bradford Corporation as surveyor, was appointed clerk of the works in the construction of the new reservoir for supplying the town with water.

TRANSFER OF THE LEIGH GAS-WORKS TO THE LOCAL BOARDS.—On Thursday last, the respective local boards of Westleigh, Pennington, and Bedford held meetings for the purpose of completing the transfer of the gas-works of the Leigh District Gas Company to the joint committee of the three boards. Each of the boards passed cheques for one-third portion of the purchase-money, £48,000, which were handed to the Gas Joint Committee referred to, and the transfer was completed by the joint committee handing over to the gas company the purchase-money. The conveyance was signed and sealed. Mr. Holden was present on behalf of the local boards, and Mr. Taylor on behalf of the gas company. Three of the directors of the gas company attended to complete the deed.

PRESTON CORPORATION WATER-WORKS.—On Thursday last a statement of the cost of the works for the water supply of Preston was laid before the Town Council, on a recommendation of the Finance Committee that the local board be authorized to apply to the Local Government Board to borrow a "further sum of £40,000 for the execution of the works." From this document it appears that the corporation purchased the works of the Preston Water Company in 1853, for a sum of £135,225, and that up to the 30th of April last there had since been expended in the construction of new works and extensions, £160,649 15s. 6d., making a total of £295,874 15s. 6d. The sum of £40,000, which, after some discussion, the board was yesterday authorized to borrow, raises the total cost to £335,874 15s. 6d.

LIVERPOOL WATER SUPPLY.—At the meeting of the Water Committee on the 27th ult., the chairman stated that Mr. Bateman and Mr. Hawksley, the engineers to whom the new scheme of water supply pointed out by Mr. Jackson had been submitted, had commenced their inspection of the sources. He hoped to have their report shortly as to which they considered the best scheme, and to be able to call the Water Committee together with a view to a special meeting of the council being held in August. Mr. Deacon, the corporation engineer, reported that in 37 districts, containing an aggregate population of 88,389, the supply to which is constant, the average domestic consumption is about 16·8 gallons per head per day. The average domestic consumption in the remainder of the borough with a 10½ hours service and the out-townships with constant service is 28·27 gallons per head per day.

COUPAR ANGUS NEW WATER-WORKS.—The opening of the new water-works, and the letting on of the water to supply the burgh, were made the occasion of a holiday in Coupar Angus on the 11th ult. No place could have been worse situated for water than that district has been hitherto. The only available sources of supply were wells, pronounced by a high authority to contain water unfit for human consumption, and a burn or brook, which, besides being the main drain of the locality for miles, was also the common sewer of the town. The source of the new supply is from several springs on the estate of Pitcur, which are guided by leading pipes to a service reservoir situated close to the Dundee turnpike. The reservoir is not only a substantial, but handsome structure, roofed over and slated. It contains, when full, about 55,000 gallons of water. This the springs fill in about 13 hours, affording about three days supply. The pressure is equally satisfactory. Last week the water was allowed to run through the pipes at full pressure, and it is satisfactory to learn that the pipes and joints did not show a leak. Mr. Lamond, the engineer, and Messrs. Scott and M'Knaught, the contractors, are to be congratulated on the successful completion of the work. The undertaking, after making allowance for contingencies, will cost nearly £4000.

RICHMOND (SURREY) WATER SUPPLY.—At a meeting of the Richmond Select Vestry, on Tuesday, July 28, Admiral Stopford in the chair, a letter was read from the Local Government Board, in reference to the water supply, stating that they had "had under their consideration the report of their inspector on his inquiry with reference to the application for a loan for works of water supply, together with the correspondence which has since taken place with the Southwark and Vauxhall Water Company. The board have referred the question as to the position of that company to their counsel, and they are advised by him that it is a company established for supplying water within the meaning of the 75th section of the Public Health Act, 1848. It is admitted that the company does in fact supply water to Richmond, but it is stated that it is without any parliamentary obligation or authority. The section above mentioned does not, however, limit its operations to companies with parliamentary obligation or authority, neither does the definition of the term water-works company, in section 2 of the Act. The board are advised that before the sanitary authorities can execute works for water supply within the limits of the company referred to, the notice contemplated by section 75, and the other proceedings for which the section provides, must first be taken." The following opinion of Mr. Glyn, dated July 20, was also read:—"The vestry cannot by any process compel the Local Government Board to issue a Provisional Order giving compulsory provisions to purchase lands for purposes of water supply, or to sanction a loan; and if the board cannot be induced to alter the opinion which they appear to have formed on the advice of their counsel, the vestry are powerless in the matter."

A NEW ILLUMINATING GAS.—Mr. Andrew Bray, who is at present in America, has invented and patented an illuminating gas which seems likely to do much not only towards supplying a purer and cheaper light than that of the ordinary coal gas, but towards solving the great problems of how to economize coal and how to dispose of our sewage. The source from which the gas is obtained is sewage water, one quart of which will yield 47 feet of the gas. Three retorts are fixed in a furnace, and when they are sufficiently heated the liquid is passed through two of them, through an iron cylinder called the hydraulic main, which is elevated above the furnace, through the third retort, and then through a coil of metal piping immersed in cold water. Afterwards the processes resemble those employed in making coal gas. It is claimed that the illuminating power of the new gas is treble that of the gas at present used in our streets, manufactories, and houses. For instance, a No. 1 burner consumes 1 foot of coal gas an hour, while a No. 3 burner consumes 3 feet; but when the new gas is used, a No. 1 burner will give as much light as a No. 3 through which coal gas is consumed. The new light is said to be clearer than ordinary gas, more like daylight in appearance, and more compatible with good health, because it is free from tar and sulphur, and cannot give off any waste carbon. As regards cost, we are informed that, while ordinary gas cannot be produced under any conditions for less than 1s. per 1000 feet, the same quantity of the new gas may be manufactured, even in a small way, for less than 1s. One of the reasons of this reduced cost is that only about 12 men would be required in making the new gas, against at least 100 who are needed under the present system. We may illustrate this by explaining that in the manufacture of ordi-

nary gas a good many men are necessary to keep up the supply of coal to the retorts, and to remove that which has been burnt into coke; but this work does not form part of the process of making the sewage gas. The inventor has received inquiries from several corporations, including Manchester, Rochdale, and Wigan, as to the value of the new gas for public purposes, and is certain that when its properties become truly known the gas will entirely supersede that at present in use. On Tuesday or Wednesday evening about 70 jets will be tried in the Pomona dancing-hall, Mr. James Reilly, the proprietor of Pomona, having taken great interest in, and given much encouragement to the development of, the invention.—*Manchester Examiner.*

NATURAL GAS FOR PUDDLING.—A novel feature in iron-working has been introduced recently by Messrs. Rogers and Bruchfield, of the Siberian Iron-Works, Pittsburgh, which consists in the application of gas from a gas-well as fuel. Their mill is situated at Leechburg, Armstrong County, and is devoted to the manufacture of sheet iron. The well is situated on the opposite side of the Kiskiminetas River from the works, and is 1200 feet deep. The gas is let from the well through steam-pipes into a horizontal cylinder, with safety-valve near by, and thence across the river to the mill. Here it is fed under the boilers through a horizontal pipe, running longitudinally their entire length, pierced with small holes. A very perfect combustion is secured in this way. It is fed in the puddling and heating furnaces in like manner, through a pipe in the rear of the fire-bridge, but here the combustion is not so perfect, and considerable black smoke is seen issuing from the stacks. An ample supply of gas is furnished by the well, and at a very regular pressure, which has not been measured, but is thought to be over 30 lbs. The volume of gas used is easily controlled by cocks, and can be adjusted for various purposes with the utmost nicety. Mr. Rogers estimates that the saving to them in fuel amounts to 700 dols. per week, and states that they obtain 33⅓ per cent. more yield from the metal than they did when using coal—at the same time producing an article of very superior quality, on account of the purity of the gas. The firm is now manufacturing an article of tin plate, which they claim to be equal, if not superior, to any manufactured abroad, which they could not do when using coal. The well was bored for oil originally, and had been in existence some four years when the idea was conceived to utilize its gas in this way, four months ago. Our readers may remember that on page 370 of our last volume we gave an account of the gas-wells of New York State, as presented by Professor Wurtz, who shows that there are three belts of gas-wells running across this State. In view of the successful application of natural gas to puddling in Pennsylvania, he suggests a trial boring here. "Think," he says, "what a noble thing may be before us. Should we find ourselves able to tap and draw from stores of gas pent up under the Catskill range, conduct this gas to the brink of tide water along the Hudson, and operate therewith upon the pure limonites of Putnam, Dutchess, and Columbia, and the magnetites of Orange and Rockland, Champlain and the Adirondacks. 'Making two blades of grass grow where one grew before' would be a feeble figure of speech to apply."—*Scientific American.*

Register of New Patents.

3478.—WORTH, R. J., Stockton-on-Tees, "*Improvements in steam-pumps.*" Patent dated Oct. 27, 1873.

These improvements relate to steam-pumps actuated directly by steam power or otherwise, and comprise several modifications. First, in the use of ports and slide-valve, similar to those of an ordinary steam-cylinder, for the admission of water to and from the pump, the ports in the valve passing completely through it, motion being given to the valves of the steam-cylinder and pump by means of the piston of an auxiliary steam-cylinder, and suitable mechanical arrangements. Secondly, in the use of a piston-valve to admit steam to cylinder and give motion to the pump-valve, the piston-valve being actuated by auxiliary steam-ports and a valve. Thirdly, in another modification, the slide-valve of steam-cylinder and pump are moved by eccentrics fixed on a crank-shaft driven by a connecting-rod."

3487.—HASELTINE, G., Southampton Buildings, London, "*An improved motive power engine to be operated by the pressure of water, steam, or compressed air, and capable of use as a pump, blowing-engine, or gas-exhauster.* A communication. Patent dated Oct. 27, 1873.

This invention is designed chiefly for working machinery hitherto driven by manual labour in places where steam power is prohibited. It consists in the arrangement of the cylinder and crank-shaft bearings at either side in one bracket common to both. Also in the introduction of the water from opposite sides to the cylinder, thereby obtaining a pressure of water on the same, perfectly counterbalanced, also in the employment of elastic pipes or conduits between the air vessel and the water distribution or inlet boxes, and in a loose water distribution box adjustable to the cylinder ports in the direction of the longitudinal axis of the cylinder.

3490.—BRAY, H., Manchester, "*Improvements in the manufacture of gas for illuminating and heating purposes.*" Patent dated Oct. 27, 1873.

This invention relates to the production of gas for illuminating and heating purposes from sewage or sewerage, or any other decomposed refuse animal, vegetable, or fœcal matter. In performing the invention a retort is employed made of cast iron, wrought iron, copper or brass, fire-clay, or any other material; the retort may be placed in an ordinary fire-grate, stove, or furnace. The reservoir containing the sewage or other matter is connected to the retort. The gas from the retort is passed through hydrocarbon and then purified.

3526.—HARRISON, C. W., High Holborn, London, "*Improvements in the manufacture of gas, and in the apparatus employed therein.*" Patent dated Oct. 30, 1873.

This invention consists in manufacturing gas for lighting and heating purposes from shale oil, or other suitable gas oil in combination with hydrogen, either alone or mixed with carbonic oxide, and either with coal or without; also in an improved apparatus to be used in such manufacture.

3528.—BOWER, G., and BOWER, A. S., St. Neots, "*Improvements in rotatory steam-engines, and in governors, which improvements are partly applicable to pumps and gas-exhausters.*" Patent dated Oct. 30, 1873.

The essential feature of novelty of this invention consists in the combination of a piston revolving eccentrically within a cylinder, which cylinder is itself caused to revolve within a series of anti-friction rollers, by the frictional contact of a hinged wing on the piston. The valve, which is worked as an expansion valve, is situate inside the body of the piston, and is regulated by the governor of the engine. A condenser and air-pump are combined with the engine, which thus constitutes an expansive rotatory condensing engine. A similar arrangement of parts is applicable to rotatory pumps and gas-exhausters.

3541.—MILNES, J. F., Park Valley, Nottingham, "*Improvements in apparatus for utilizing sewage.*" Provisional protection only obtained. Dated Oct. 31, 1873.

The improvement consists in constructing a series of pits along the sewer bottom. The top of each pit is provided with a grating, each succeeding grate being a finer gauge than the preceding one; over each pit the crown of the sewer has an orifice, through which is passed a tube, the bottom of which fits and rests upon the kerb of the pit, while the top conforms to the shape of the orifice in the crown of the sewer, so as to prevent the escape of gases. The solid sewage deposited in the pit is emptied through the tube by means of buckets, Archimedian screws, or equivalent contrivance.

3549.—ROOKE, A., Millwall, London, "*Improved means of and apparatus for 'stopping' boiler and other tubes.*" Provisional protection only obtained. Dated Oct. 31, 1873.

This invention consists of a rod threaded at one end, and with a head at the other. Loose washers are put upon the rod, with packing between them, which can be bulged outwards against the wall of the tube, in which they are fitted by a nut. The packings and washers are distanced by a sleeve tube.

3554.—SWEET, A., Hampstead Road, London, "*Improved mechanical arrangements for water supply purposes, whereby waste is prevented, regulation effected, and 'tremor' avoided.*" Patent dated Nov. 1, 1873.

This invention mainly relates to the adoption of arrangements in which a central axis or rod is arranged as a screw, so that when the water-waste preventer or valve is opened in order to regulate its descent, a casing external to it of correspondingly larger diameter, or in some instances blades are arranged with and attached to said central axis, so that by the revolution of said external casing or blades the descent is arranged in gradual and equal revolution. The same principle of action is applied to taps or cocks.

3555.—GERCKE, K. L. H., Berlin, "*Improvements in apparatus for regulating the flow of gas or other fluids.*" A communication. Provisional protection only obtained. Dated Nov. 1, 1873.

This provisional specification describes a self-acting apparatus consisting of a balance-arm having a valve at one end and a counterweight at the other, and provided with an inclined guide way on which a ball is free to move to regulate the working of the arm and valve. According to changes of pressure in the column of gas between this apparatus and the burners, the ball moves nearer to or farther from the counterweight, thereby increasing or diminishing the weight and regulating the opening of the valve in proportion to the increase or decrease in the consumption of the gas.

3588.—ROWLEY, J., Camberwell Road, "*Improvements in obtaining colouring matters and other substances from certain waste materials resulting from the manufacture of gas.*" Provisional protection only obtained. Dated Nov. 4, 1873.

This invention relates to the production of blue and other colouring matters from certain waste materials resulting from the manufacture of gas. According to these improvements, the waste or spent materials obtained from ordinary gas-purifiers is well mixed with thin milk of lime, in the proportion of about 1 cwt. of the waste material from gas-purifiers with 60 gallons or thereabouts of water, and two or more pounds of lime, letting the mixture stand for insoluble matters to subside, adding about two pounds of soda crystals for 1 cwt. of the above material. Steam is passed through the separated clear liquor; to the latter is added (in the production of a blue colouring matter) a solution of one pound or thereabouts of iron, dissolved in rather more than one pound of nitric acid and five or six ounces of sulphuric acid, the whole then well stirred, and afterwards about one pound of sulphuric acid added. The mixture is then set aside for the colouring matter thus produced to fall to the bottom of the vessel. The supernatant liquid being poured away, the colouring matter is collected on a filter, washed with water till the water runs away clear, and the colouring matter drained and dried. In this process the use of steam is sometimes dispensed with, or heat is applied in other ways.

3607.—SOUL, M. A., Leadenhall Street, London, "*Improvements in self-lighting gas apparatus.*" A communication. Patent dated Nov. 6, 1873.

This invention has for its object to maintain a minute flame in an auxiliary burner from which the illuminating burner is ignited, and it consists in the employment of a flexible or moveable diaphragm actuated by the pressure of the gas supply for automatically opening and closing the cock or cocks of the burner or burners, and in the means provided for regulating the supply of gas to the auxiliary and main burners, and in the mode of pivoting and securing the plug of the stop-cock in place, and in the employment of a burner of a peculiar kind to perform the office of the auxiliary burner.

A tube which connects the apparatus to the gas supply is provided with a cock at any suitable point for regulating the supply of gas, or entirely cutting it off. This cock may be so constructed that when turned partly on in one direction, the full supply of gas will be cut off, but allows a small portion to supply the auxiliary burner; and when turned fully on in the opposite direction, will be entirely cut off. When this cock is open, the gas enters a chamber through a tube. The chamber is closed air-tight above by a diaphragm, which is formed preferably of animal membrane, and against which the gas exercises a certain pressure. A casing above the diaphragm is provided with air-holes, forming a vent to the same, and allowing the diaphragm to move freely without receiving any resistance from the air above it.

From the chamber first named the gas enters a pipe through a screw-cock, which regulates the supply of gas to the burner. The diaphragm is tied in the form of a cone, and charged with removeable weights.

The external pressure against the diaphragm is so regulated that it is forced up by a certain pressure of gas to which it is adjusted. While that pressure is maintained it remains up, and falls upon the pressure ceasing.

By the increase of the pressure a plug is rotated, which opens the large burner, which is then ignited by the flame from the smaller one, the flame of which becomes suddenly increased until the flame of the large burner assumes its proper size, when the rotation of the plug extinguishes the small burner; and when the increased pressure necessary for the large burner is withdrawn, the reverse action takes place, and the auxiliary burner is re-lighted. The plug is hung in pivots, so as to turn on its axis with the least amount of friction. Screws are fixed in plates covering the openings at each end of the barrel of the cock, and form the pivots in which the plug rotates. These screws terminate in fine points, and fit in corresponding minute indentations in the centre of the plug.

A hood is provided for the small burner, and serves as a protection to its flame from being extinguished by draughts of air, the air necessary for combustion entering through small holes underneath it.

3610.—GURNEY, J., Bradford, "*Improvements in the construction of taps or valves.*" Patent dated Nov. 6, 1873.

This invention relates to that class of taps or valves in which an india-rubber diaphragm is used, and consists in dispensing with any mechanical means for acting upon the diaphragm, and in making the diaphragm solid or without any hole in the moving portion thereof, whilst the pressure of the liquid or fluid is caused to open or close the passage through the tap or valve by acting upon one or the other side thereof.

3628.—NUTTALL, F. D., St. Helen's, Lancs, "*An improved arrangement of gas-box and reversing gear applicable to Siemens' regenerative gas-furnaces.*" Patent dated Nov. 7, 1873.

This consists in replacing the screw stop-valve situate above the valve, known as the gas reversing valve, by a throttle valve in the passage to the gas-box at one side of the said gas reversing valve. With gas-box and reversing gear and stop-valve arranged as above described, a door is placed above the gas reversing valve for inspection and cleaning purposes, and the upper bearing of the throttle stop-valve is formed of part of the top of the gas passage. The said bearing is sufficiently large to allow, when detached, of removal of the said throttle stop-valve.

3632.—FRASER, A. C., New Barnet, and Watson, W., Great Ayton, Yorks, "*Improvements in treating and utilizing sewage.*" Patent dated Nov. 7, 1873.

The object of this invention is to render sewage commercially available in the manufacture of artificial manure and other manufacturing purposes by the

economical elimination and treatment of the organic and oleaginous elements of the sewage, for which purpose aluminous schistus and the analogous oil or jet rock are calcined under atmospheric influence by the aid of peat, wood, or coal bats, the combined properties of which are sulphate of alumina, sulphate of iron, sulphate of magnesia, and sulphate of lime, with that of vegetable carbon. The above combined elements are, when necessary, saturated with dilute sulphuric acid, and intermixed with clay, sulphate of lime, or prepared dry mould. The improved preparation may be applied to the treatment of the sewage in the form of filter-beds or in a pulverized state or otherwise. The treated sewage, &c., may be used as manure, or for other purposes.

3636.—Darlington, F. A., St. Helen's Place, London, and Scott, F., Portland Place, London, "*Improvements in machinery for charging and discharging gas-retorts.*" Patent dated Nov. 8, 1873.

This invention relates to novel machinery for effecting automatically, and in a convenient and expeditious manner, the filling or charging of gas-retorts with coal, and the removal or discharge of the coke from the same.

The invention consists first in the combination of a scoop with a steam-engine and with adjusting mechanism, whereby the said scoop is brought into the required positions for receiving the coal, and introducing the same into any or all of the retorts. The engine is mounted upon a travelling carriage or frame provided with flanged wheels, which run on rails laid in the floor of the retort-house, and extending longitudinally in front of the retorts, and whereon the machine is adjusted opposite any one of them. The side-bars of this travelling carriage also form rails, and the engine is provided with suitable wheels to run thereon, and is moved upon the same towards or away from the mouth of the retorts. The adjustment of the engine upon the travelling carriage, and of the latter upon its rails, is effected by suitably arranged gear-wheels and apparatus connected therewith. The engine is attached to the boiler, and the latter is so arranged within a case or shell that the boiler is capable of moving up and down within the case or shell to serve as an accumulator for hydraulic apparatus, hereinafter described.

The scoop is constructed of plate iron or steel. It is semi-cylindrical in form throughout the part which projects within the retorts, the remainder being cylindrical, and its end adjacent to the engine is attached to a shaft. The latter is supported to turn freely in suitable bearings fitted to slide in vertical slots in standards of cast iron or other suitable metal to adjust the scoop to the height of any of the retorts.

The standards are attached to two or more bands or hoops, which are fitted to turn freely in collars or rings placed around the boiler or its enclosing case. Each of these bands or hoops has a quadrant or sector-rack geared with a pinion, which may be thrown into or out of gear with the engine-shaft, and is thereby operated to turn the scoop around the boiler to receive the coal from hoppers or other receptacles, and then turn it back into the proper position for introducing it into the retorts.

Between the standards are placed two hydraulic cylinders whose rams are connected at their upper ends to a cross-head; two connecting-rods extend from the ends of the said cross-head to the bearings of the scoop. A pump driven from the engine-shaft is arranged to deliver water directly into the hydraulic cylinders, or to actuate a ram placed below the boiler, the boiler serving as an accumulator for the same. By this hydraulic apparatus the rams connected with the cross-head are raised, and the scoop with them, to any desired height.

To the front of the standards is attached a vertical spindle or shaft, which passes through bosses cast on the scoop bearing. Between these bosses is placed a cam, which is secured on the spindle by a feather, so that it cannot turn independently of the spindle, but will move freely up and down thereon with the scoop. A strong spiral spring is coiled around the shaft of the scoop, one of its ends being attached to the shaft, and the other end to the bearing. To the face of the scoop-bearing is attached a pawl arranged to drop into a notch in the cylindrical part of the scoop, and prevent its being turned by the spring, except when the pawl is raised. For this purpose a lever is arranged in such a position that when the scoop has entered far enough into a retort, the lever strikes a projection on the travelling carriage, and turns the vertical spindle and its cam, lifting the pawl, and leaving the scoop free to turn over by the action of the spring, and thereby deliver or discharge its load into the retort; or the scoop may be turned by hydraulic power or by other suitable means.

At the back of the standards is arranged a second vertical spindle, which carries a bevel pinion so fitted as to turn with the spindle, but free to slide vertically thereon, and geared into a bevel-wheel on the scoop bearing. The lower end of the spindle carries a toothed pinion, and in combination with the same is arranged a pawl which prevents the turning of the pinion in one direction. At the end of one side of the travelling carriage is placed a rack into which the pinion gears. As the scoop is withdrawn from a retort, the pinion comes in gear with this rack, and through the ensuing rotation of the pinion and spindle the scoop is turned back on its axis into its original position. If desired, the end of the scoop that enters the retort may be provided with a bearing-roller.

The invention consists secondly in the employment of a rake for discharging or withdrawing the contents of the retorts, and which occupies the same place in the machine as the scoop. The "rake" is a shaft of the proper length to extend far enough into the retort, and having a screw-thread or spiral-blade or sections thereof on the part which enters the retort. The required movements are imparted to the "rake" by a rack fixed on the side of the travelling carriage and a pinion attached to a vertical spindle. The pinion is governed by a pawl and ratchet-wheel, so that it can turn only in the proper direction. The end of the "rake" is geared by bevel-wheels with this spindle in the same manner as the scoop, and by the rack and pinion through this gearing the "rake" is operated to turn on its axis in entering the retort, but is withdrawn without turning.

3639.—Boyell, R., Birmingham, "*Improvements in apparatus for regulating and controlling the flow of liquids.*" Patent dated Nov. 8, 1873.

This invention refers to improvements in self-closing cocks or taps for regulating and controlling the flow of water or other liquids so as to prevent waste. The body of the cock or tap is formed with a lubricating chamber to receive an enlarged portion of a vertical or horizontal spindle, the lower or enclosed end of which fits into a ground centre in the base or side of the tap. The upper end of the spindle is exposed above the tap and has a suitable handle attached thereto, a screwed cap being secured upon the top of the lubricating chamber, which is filled with grease or fat.

Upon the enlarged portion of the vertical or horizontal spindle are formed two cams, and on the side of the lubricating chamber is a projecting lug, the cams being situate one over and one under the lug or on each side thereof when the tap is off; around the enlarged part of the spindle are placed one or more springs formed of a section or sections of an open tube of metal, india-rubber, or other suitable material, the open edges of which fit into the sides of the spindle, cams, and lug.

Upon the lower or enclosed end of the vertical or horizontal spindle are two projections or keys, one on either side opposite the ingress opening, which is formed as a cup, and a loose ball made of india-rubber, metal, or other suitable material is employed as a valve, and into or on the ingress end of the tap is screwed a nozzle for connexion to the water-pipe, cistern, or other supply. The bib or spout of the cock or tap may be of any convenient form.

3641.—Peacock, T., Wood Green, Peacock, J. C., Finsbury Park Road, "*Improvements in gas cooking apparatus.*" Patent dated Nov. 8, 1873.

The object of this invention is to economize the heat derived from the combustion of gas, and thereby to render it more efficient than heretofore for the cooking of viands. To this end the walls of the oven, and also the top and bottom thereof, are made of such a thickness and of such materials as will retard or prevent the radiation of heat generated within the oven, and the oven is so ventilated by an exact regulation of its air supply, and by drawing off the products of combustion at the lowest possible level, as to ensure the retention at the upper part of the oven of a comparatively quiescent heated atmosphere. The oven is formed with an inner lining, preferably of sheet iron, which may be either tinned, galvanized, or enamelled, and with an outer casing of wood or iron (but preferably of wood) leaving the space between the casing and lining, say from one to three inches. This space is filled with dry powdered lime or other suitable non-conducting material. When the oven is provided with a swing door, which is the usual method of construction for giving access to the interior, it is constructed after the manner of the walls of the oven.

3663.—Ingham, J. G., Hoxton, "*Improvements in the manufacture of flexible metal piping and tubing.*" Patent dated Nov. 11, 1873.

The object of the invention is to secure flexibility by binding a sheet of metal around a spiral coil of wire. A sheet of lead or other metal to form the pipe or tube is rolled around a spiral coil of steel or other metal wire and bound tightly with twine or other ligature so as to press the lead or other metal between the coils of the wire even with the inner surface of the wire. The pipe or tube thereby acquires the flexibility of the coil and increased power of resisting pressure.

3666.—Toussaint, J., 64, Larches Street, Sparkbrook, Birmingham, in the county of Warwick, "*Improvements in the construction and arrangements of mould or cores for casting iron tubes and pipes and other analogous articles.*" Provisional protection only obtained. Dated Nov. 11, 1873.

In carrying out this invention, cores are made of segments of a circle with overlapping curved edges. The segments are regulated by springs and a central tapered rod, which permit of shrinkage and the removal of the tube or pipe.

3697.—Benson, M., Southampton Buildings, London, "*Improvements in the method of manufacturing gases for illuminating and heating purposes, and in the apparatus employed therefor.*" A communication. Patent dated Nov. 13, 1873.

The invention consists in producing vapour or gas from oil, petroleum, and other oleaginous and carbonaceous substances, by passing superheated steam through pipes in the body of the oil. By thus using superheated steam for vaporizing the oil, the formation and deposit of solid carbon is prevented by the application and diffusion of heat in such a manner and degree as is requisite without decomposing it; and by mixing superheated steam or vapour with the vapour or gas thus produced we increase the heat, combine the vapours, produce gas for illuminating purposes, secure perfect combustion, and save largely in the quantity of carbonaceous substances required, and in a more economical way than has heretofore been accomplished. By this improvement, a carbonated hydrogen gas is produced by decomposing superheated steam, and carbonating the same by means of a carbon gas made from petroleum or any other oleaginous substance, and combining the same together under great heat, thereby producing a fixed carbonated hydrogen gas in the manner hereinafter described.

3699.—Holman, S., Laurence Pountney Lane, London, "*Improvements in direct-acting steam-pumps and pumping-engines, and in condensers and governors therefor, parts of which improvements are applicable to other steam-engines.*" Patent dated Nov. 13, 1873.

This invention comprises the following features of novelty:—1. Cushioning the ends of the main slide-valve in the arrangement of steam-pump described in a former specification, No. 3428, 1872. 2. Simplifying the arrangement of steam-pump also described in the said specification, by substituting a single three-way cock for the two separate cocks previously described. 3. The application of india-rubber tubular buffers to suspended valves of air and gas-pumps for rapidly closing the same. 4. The general arrangement of the valves for air and gas-pumps by supporting their guide-spindles on cross-bars above them, one, two, or more valve guide-spindles being carried in each cross-bar. The said cross-bars and valves being all easily accessible. 5. A rotatory dash-wheel condenser for steam pumping-engines. 6. The application of a governor to steam-pumps driven from the spindle of the dash-wheel condensing apparatus last referred to.

3712.—Tongue, J. G., Southampton Buildings, London, "*Improvements in water or other fluid meters.*" A communication. Patent dated Nov. 14, 1873.

This invention has for its object the means of ascertaining the exact quantity of water which passes through pipes, being particularly applicable to hydraulic apparatus or to the supply of water to towns. An important feature of this improved water-meter consists in the use of a compound rotary piston forming a wheel with arms and floats, which do not contract at any part of the transverse section of the passage. Another important feature of this invention consists in nearly the entire exclusion of all the resistance through friction by the use of a material of which the particular quality imparts to the wheel with arms and floats (even under a great pressure) a specific gravity equal 1. This material for making a wheel having the requisite qualities is what is known as "hartgummi" or vulcanite.

3733.—Fletcher, T., Warrington, "*Improvements in gas heating apparatus for laboratory use.*" Provisional protection only obtained. Dated Nov. 17, 1873.

The features of novelty in this invention consist in a simple and compact form of heating apparatus for laboratory use, which is capable of affording a wider range of heating power than has hitherto been practicable with a single apparatus, which is accomplished by having a ring of burners and a single jet of gas, either of which may be lighted inside a cylindrical casing, or the ring may be utilized for supplying gas, to be lighted above a wire-gauze covering, to such cylindrical casing on the Bunsen principle; and the pipe which supplies the single jet and its nozzle may be utilized as a blast-pipe for increasing the supply of air to, and consequently the heating power of such Bunsen flame.

3742.—Scott, H. Y. D., Ealing, "*Improvements in the purification of sewage water.*" Patent dated Nov. 18, 1873.

This invention relates to the treatment of sewage water coloured with dyes, for the purpose of removing the colour therefrom. It is preferred to treat the sewage by the lime method of precipitation, using no more lime than is essential for clarification.

3762.—Huntoon, H. P., Massachusetts, U.S., "*Certain new and useful improvements on pipe-tongs.*" A communication. Patent dated Nov. 19, 1873.

The nature of the invention on pipe-tongs having jawed levers crossing each other consists as follows:—

The first part of it relates to the hook jaw-lever adjusting screw, pivoted within and connected with such lever, and screwed into and through the fulcrum pin arranged within and applied to the slot of such lever, and to revolve within the tooth jaw-lever.

The second part of such invention relates to a yoke combined with the toothed and hook jawed-levers, their fulcrum pin and the adjusting screw or screws thereof, the purposes of the yoke being not only to support the pin and relieve it from contact with and direct strain of the screw or screws, but to save weakening the pin by forming through it a hole to receive the journal on the end of the screw.

The third part of such invention relates to the combination of an arm hinged to the tooth jaw-lever, with adjusting screws so connected with or applied to the said arm and the hook jaw-lever as to be capable, by revolving one of them, of moving the arm and the tooth jaw-lever either towards or away from the hook jaw, in order for the adjustment of the jaws either nearer to or farther from each other, as occasion may require.

3781.—White, W., Hampstead, "*Improvements in the precipitation of sewage and other foul waters, and in the preparation of precipitating materials.*" Patent dated Nov. 20, 1873.

In the provisional specification of a patent No. 2532, dated July 24, 1873, it is stated that, in the treatment of sewage and cesspool water, milk of lime is introduced to neutralize any excess of acid and to precipitate calcic phosphate, which in some cases is mixed with the sewage or cesspool water. Instead of milk of lime simply, this specification describes the use of lime, charcoal, or phosphatic charcoal.

3783.—Forbes, G. H., Broughton Rectory, Northampton, "*Improvements in compounds designed for the manufacture of cements or artificial stones, capable also of being used as an artificial fuel.*" Patent dated Nov. 20, 1873.

This invention relates to improvements upon former inventions described in the specifications of letters patent, No. 1816 (May 19, 1873), and No. 1832 (May 20). According to this invention, the foul or refuse lime of gas-works, or the equivalent thereof, is intimately mixed with coal tar or peat tar, or wood tar or mineral tar or pitch, or any similar bituminous substance, or with a combination of any two or more of them, and with chalk or limestone, or any combination of the two, either with or without petroleum or similar hydrocarbon oil, and with or without vegetable or animal oil or fat or fatty matter. Water is used to bring about an intimate mixture of the foul lime and the chalk or limestone.

3795.—Kenyon, R. W., Accrington, "*Improvements in taps or cocks.*" Provisional protection only obtained. Patent dated Nov. 21, 1873.

This invention relates to taps or cocks employed for regulating and controlling the passage or flow of steam or liquids, and the object is to so construct them as that the paper plugs shall have a largely increased bearing surface within the barrel and so prevent leakage.

3796.—Ramsden, J. C., Lightcliffe, Yorkshire, "*Improved apparatus for generating steam, economizing fuel, and utilizing the gases arising from the combustion thereof.*" Patent dated Nov. 21, 1873.

This invention has for its objects the construction of steam-boilers more especially designed for use in connexion with liquid fuel, there being provision made for warming or heating the air supplied to the combustion chamber; and the gases arising from combustion are, after leaving the flue or flues or tubes of the boiler, further utilized.

3803.—Trukman, H. P., Pentonville, "*Improvements in apparatus for measuring liquids.*" Provisional protection only obtained. Dated Nov. 21, 1873.

This invention is designed to supply an accurate and reliable apparatus for measuring liquids. The liquid is measured by means of the following contrivance:—Inside the case is arranged a displacement-piece, mounted on bearings, placed at such a height that the axis of the said piece will be level with the top of the overflow or outlet-tube; therefore, by turning the same on its axis, it may be either brought entirely above the surface of the liquid in the case, or partially or entirely immersed therein, and according to the extent of its immersion will be the quantity of liquid displaced and discharged through the outlet-tube.

3807.—Ross, W., Glasgow, "*Improvements in apparatus for supplying and regulating the quantity of water used in water-closets and other cisterns or vessels.*" Patent dated Nov. 22, 1873.

This invention refers to a new simple construction of one-chambered service cistern and its fittings for supplying only a fixed or desired quantity of water down to water-closets for flushing them, or to other vessels where a measured quantity of liquid is required at each operation and action at intervals; the intervals being regulated by the entrance-pipe or its valve, which may be of the ordinary construction of ball float-valves in use, but small, so as to fill the box slowly for water-closets service, and fitted to one top end of this cistern.

3822.—Hawkins, J. G., Sheffield, "*Improvements in apparatus used in the manufacture of gas.*" Patent dated Nov. 22, 1873.

The object of this invention is to relieve the retorts from unnecessary pressure when in action by removing the seal in the hydraulic main, and so arranging the apparatus, that when the retort is not actually employed in making gas, the dip-pipe, or its equivalent, shall become automatically sealed. The invention consists in enlarging within the hydraulic the ordinary dip-pipe. This pipe is made to dip into an annular cup, which is suspended by a rod from the top of the H-pipe, the inner ring of the cup being slightly lower than the outer one.

A modification of this arrangement consists in closing the bottom of the ordinary dip, and inserting a pipe, the top of which is level with the liquid in the hydraulic main, thereby making it a sort of cup. Another opening is also made in the dip, which is partially divided by a partition formed by bending the upper part of one side inwards and downwards.

The hydraulic being supplied with liquid to a height level with the top—or, rather, above the inner ring of the annular cup or top of the pipe in the modification—the liquid will flow into and fill the cup; but, as soon as any gas is evolved in the retort, the gas will, in its endeavour to escape into the hydraulic main, force the water out of the cup, and maintain for itself a free passage. When the gas ceases to come over, however, either from the opening of the lid or otherwise, the liquid in the dip-pipe will immediately flow into the cup, and effectually seal the gas-way. Should the cup become choked from any unforeseen cause, the gas will flow down the pipe in either cup, and escape from its bottom edge in the ordinary manner. In this case the depth of seal may be materially reduced by lowering the cup, so that the gas may escape from the dip in the usual way.

3843.—Wirth, F., Frankfort, "*A new method of introducing burning gas into melting furnaces, and the apparatus employed therefor.*" Patent dated Nov. 25, 1873.

My improved injector is constructed for introducing burning gas, especially oxide of carbon, into high furnaces, or other smelting furnaces, by the sucking power of the blast, without the aid of any other power. Into the water tuyer of the blast-furnace a cast-iron tube is inserted, having a double conical mouth, and its back end being closed, with the exception of a well-turned aperture, through which the blast-pipe is introduced. At the forward end of the said tube are four well-turned guide-bars. The mouth of the blast-pipe is conical, turned outside, and ground inside of the injector mouth. The blast-pipe slides easily in the said tube and also in the lower part of the hanging blast tube. The blast coming from the hanging blast tube passes through the tube-box and through an oval opening into the blast-pipe. The gas enters the injector through a drawn tube, which is closed by a stop-cock. By withdrawing the blast-pipe, an annular space is formed between the mouths of the injector and the blast-pipe; through this annular space the gas enters the furnace, sucked by the sucking power of the blast, and meets together with the blast directly at the entrance into the furnace. On each injector is fixed a small water-gauge. Each blast-pipe is provided with a gas-injector, the whole of the said injectors being fed by the gas-conduct, between which and the generator a purifier is arranged. The water in this purifier is mixed with burnt limestone, the quantity being regulated according to the impurity of the gas.

Notes and Queries.

A Country Manager asks readers who are well up in chemistry, if they can recommend any ingredient or solution, the use of which would "fix" the ammonia in dry lime purifiers during the process of "changing." "I need not point out the advantage of removing a frequent cause of complaint from residents in the neighbourhood of gas-works." [The recommendation which occurs to us at the moment is that our correspondent should prevent the ammonia from reaching his purifiers.—Ed. J. G. L.]

Share List,

OF

Metropolitan Gas and Water Companies.

(*Corrected by Mr.* F. N. Golding, *Sun Court, Cornhill, from the latest Stock Exchange Quotations.*)

Number of Shares issued.	Amount per Share.	Name.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£	GAS COMPANIES.	£ s. d.	£ s. d.	£
8000	20	Anglo-Romano	20 0 0	10 0 0	14 — 16
5000	20	Bahia (Limited)	20 0 0	3 0 0	10 — 11
1000	20	Do., preference	20 0 0	10 0 0	25 — 27
750	20	Do., do., redeemable	20 0 0	10 0 0	20 — 22
40000	5	Bombay (Limited)	5 0 0	6 15 0	6¾ — 6¾
10000	5	Do., fourth issue	4 0 0	6 15 0	1—1¼ pm.
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge., and Holywell.)	20 0 0	10 0 0	34 — 35
7500	20	Cagliari (Limited)	20 0 0	7 0 0	14 — 16
180000	10	*Chartered* A ordinary	10 0 0	10 0 0	16¾ — 17
25000	10	Do. A, 5 per cent. preference	10 0 0	5 0 0	14¾ — 15
20000	10	Do. A, 5 per cent. do., 2nd issue	10 0 0	5 0 0	14¾ — 15
30000	10	Do. A, 5 per cent. do., 3rd issue	10 0 0	5 0 0	4¼—4½ pm.
10000	10	Do. B, 4 per cent. maximum	10 0 0	4 0 0	7 — 7½
20000	10	Do. C, 10 per cent. preference	10 0 0	10 0 0	20¾ — 21¼
12000	25	Do. D, 10 per cent. preference	25 0 0	10 0 0	51 — 53
448875*l.*	Sk.	*Commercial*	100 0 0	10 0 0	171 —174
20000	20	Continental Union	20 0 0	8 0 0	18¼ — 19½
20000	20	Do., new	12 10 0	8 0 0	1¼—¼ dis.
10000	20	Do., preference (Grmny.: Strsbg. France: Cette, Nismes, Montargis Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	24 — 26
5000	10	*Crystal Palace District*	10 0 0	10 0 0	16 — 16¼
5000	10	Do., preference	10 0 0	6 0 0	11¼ — 12½
10000	10	Do., ordinary	10 0 0	7 0 0	12¼ — 13¾
2500	10	Do., converted	2 0 0	10 0 0	1¾ — 2 pm.
2500	10	Do., converted	2 0 0	7 0 0	1 —1¼ pm.
23406	10	European (Limited)	10 0 0	10 0 0	13¾—14¼ xd
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	7 10 0	10 0 0	2¼—2¾ xd.
4054	10	Foreign and Colonial (Limited)	10 0 0	..	9 — 10
5000	10	Hong Kong (Limited)	10 0 0	10 0 0	14 — 15
1560000	100	*Imperial*	100 0 0	10 0 0	172 —175
78000	12½	Do., new shares	12 10 0	7 0 0	16¼ — 16¾
1300	100	Do., bonds	£100	10 0 0	197 —200
56000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Frankfort-on-Maine, Haarlem, Stolberg, and Vienna.)	43 15 0	9 2 6	56 — 58
3000	40	*Independent*	40 0 0	10 0 0	65 — 67
3000	10	Do.	10 0 0	5 0 0	8¼ — 9¼
3000	20	Do.	20 0 0	7 10 0	25 — 26
4500	10	Do., D	3 0 0	10 0 0	3 — 4 pm.
378350*l.*	Sk.	*London*	100 0 0	10 0 0	171 —173
150000*l.*	Sk.	Do., 1st preference	100 0 0	8 0 0	118 —121
14450	Sk.	Do., 2nd preference	100 0 0	6 0 0	
4350	Sk.	Do., 3rd preference	100 0 0	6 0 0	
7622	25	Do., A shares	12 10 0	6 0 0	
263051.	All	Do., Debenture stock	100 0 0	5*l.* & 6*l.*	
15000	5	Malta and Mediterranean (Limited)	5 0 0	3 0 0	2 — 2¼
6000	5	Do., preference	5 0 0	7 0 0	5 — 5½
20000	5	Mauritius (Limited)	2 0 0	7 0 0	2 — 2¼
25000	20	Monte Video (Limited)	20 0 0	..	22 — 23
8000	10	Nietheroy, Brazil (Limited)	10 0 0	..	
30000	5	Oriental (Calcutta)	5 0 0	9 0 0	7 — 7¼
30000	5	Do., new shares	2 10 0	9 0 0	¾—1¼ pm.
10000	5	Ottoman (Limited)	5 0 0	nil.	2 — 2½
17500	10	Pará (Limited)	10 0 0	7 0 0	6 — 8
27000	20	*Phœnix*	20 0 0	10 0 0	34 — 35
360000*l.*	100	Do., new	55 0 0	7 10 0	71 — 73
144000*l.*	Sk.	Do.	100 0 0	5 0 0	93 — 95
5000	20	*Ratcliff*	20 0 0	10 0 0	34 — 36
36000	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	31 — 32
7359	5	Singapore (Limited)	5 0 0	7 10 0	4¾ — 5
2000	5	Do., preference	5 0 0	7 10 0	5¾ — 6
1500	32½	Shanghai	32 10 0	12 0 0	30 — 32
4000	50	*South Metropolitan*	50 0 0	10 0 0	86 — 88
4000	12½	Do.	12 10 0	10 0 0	21 — 21¼
20000	12½	Do., new shares	5 0 0	10 0 0	6¼— 6¾ pm.
15000	10	*Surrey Consumers*	10 0 0	10 0 0	16¾— 17
10000	10	Do., new	7 0 0	10 0 0	5 — 6 pm.
9000	4	United General (Limerick)	4 0 0	2 10 0	2 — 2¼
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	14 — 15
1500	10	Do.	10 0 0	7 10 0	11 — 12
2957	10	Do.	10 0 0	7 0 0	
993	10	Do.	3 0 0	7 0 0	
16000	5	*West Ham*	5 0 0	10 0 0	7¾— 8
10000	5 †	Do., new shares	2 10 0	10 0 0	3 — 4
		WATER COMPANIES.			
12000	100	Chelsea	100 0 0	6 0 0	122 —124
1800000	100	East London	100 0 0	6 0 0	—125
8000	50	Grand Junction	50 0 0	7 0 0	76 — 78
5840	25	Do., ¼ shares	25 0 0	7 0 0	36¼ — 37½
2160	25	Do., new do.; maximum dividend, 7½ per cent.	25 0 0	7 0 0	31 — 33
4396	100	Kent	100 0 0	6 10 0	128 —130
5339	100	Lambeth	100 0 0	6 5 0	123 —125
1161	100	Do.	20 0 0	6 5 0	
442	100	New River	100 0 0	8 0 0	170 —180
4475	100	Do.	30 0 0	8 0 0	50 — 55
400000	100	Do., debenture stock, 4 per cent.	100 0 0	4 0 0	97 — 99
8036	100	Southwark and Vauxhall	100 0 0	5 5 0	104 —106
1296	100	Do., preference stock	100 0 0	5 0 0	101 —103
	100	Do., D shares	100 0 0	5 5 0	95 — 97
		Do.	..	4 10 0	
	108	Do., new ordinary	..	4 10 0	
1800	100	Do., new ordinary, No. 1	49 0 0	4 10 0	
12172	61	West Middlesex	61 0 0	£6 per sh.	121—123

APPLICATIONS FOR LETTERS PATENT.

2587.—AITKEN, H., Falkirk, "Improvements in the manufacture of illuminating gas, and in the apparatus or means employed therefor." July 24, 1874.

2605.—WISE, W. L., Adelphi, London, "Improvements in stop-valves." A communication. July 25, 1874.

2618.—GAUKROGER, J., Todmorden, FIELDEN, S., Walsden, and AITCHISON, A., Manchester, "Improved apparatus for generating gas for lighting, heating, and cooking." July 27, 1874.

2631.—BUDENBERG, A., Manchester, "Improvements in illuminated pressure and vacuum gauges." A communication. July 28, 1874.

2632.—BOWNESS, W. D., and JUDGE, J., Bishop Auckland, "Improvements in apparatus for generating and purifying gas for illuminating and other purposes." July 28, 1874.

2642.—TWEDDLE, H. W. C., New York, U.S.A., "Improvements in the manufacture of paraffin and illuminating and lubricating oils from petroleum." July 29, 1874.

2660.—CLARKE, J. F., Moorgate Street, London, "Improved apparatus for distributing water in public thoroughfares." July 30, 1874.

GRANTS OF PROVISIONAL PROTECTION.

2071.—RUMPFF, C., New York, U.S.A., "A new or improved dry process of oxidizing 'anthracene,' and improvements in the manufacture of dyes and other colouring matters from the product so obtained." June 15, 1874.

2480.—LAKE, W. R., Southampton Buildings, London, "Improvements in the manufacture of peat fuel, and in apparatus therefor." A communication. July 16, 1874.

2481.—FEARNS, F. H., and JACKSON, W., Marlborough Road, Surrey, "Improvements in stoves for cooking and heating by gas, and in apparatus connected therewith." July 16, 1874.

2493.—HACHE, E. H., Paris, "An improved mechanical apparatus for indicating by clockwork the excessive pressures of lighting gas." July 16, 1874.

2495.—NEWTON, W. E., Chancery Lane, London, "Improvements in the manufacture of inflammable gas for illuminating and other purposes, and in the apparatus to be used therein." A communication. July 16, 1874.

2496.—WISE, W. L., Adelphi, London, "Improvements in apparatus for purifying and filtering water." A communication. July 16, 1874.

2499.—FINCH, B., High Holborn, London, "Improvements in self-regulating supply-valves for tanks." July 16, 1874.

2506.—CHIVERTON, E., Southsea, Hants, "Improved means of and apparatus for lighting gas-lamps or burners." July 17, 1874.

2520.—JOHNSON, J. H., Lincoln's Inn Fields, London, "Improvements in the separation of ammonia from illuminating and other gases." A communication. July 18, 1874.

2526.—STRATEN, E. VAN DER, Antwerp, "Improvements in apparatus for the combustion of air and gas for heating purposes." July 18, 1874.

2546.—PERCH, W., and HIGGS, P., Cardiff, "Improvements in the pistons of steam, air, gas, or vapour engines, whereby increased surface is obtained." July 21, 1874.

2569.—NEWTON, W. E., Chancery Lane, London, "Improvements in gas-burners." A communication. July 22, 1874.

2571.—CLARK, F. W., Hackney, "Improved apparatus for generating carburetted hydrogen gas." July 22, 1874.

2572.—FORBES, G. H., Broughton Rectory, Northampton, "Improvements in the manufacture of gas for illuminating and heating purposes." July 22, 1874.

INVENTIONS PROTECTED FOR SIX MONTHS ON THE DEPOSIT OF COMPLETE SPECIFICATIONS.

2563.—CLARK, A. M., Chancery Lane, London, "Improvements in steam-pumps." A communication. July 22, 1874.

2566.—MOULY, F. V., Leicester Square, London, "Improvements in apparatus for heating and ventilating dwelling-houses and other buildings." July 22, 1874.

2581.—MONCTON, E. H. C., Fineshade, Northamptonshire, "Improvements in pulping, drying, and converting peat into fuel and other useful products, and in the apparatus and methods necessary for effecting and applying the same." July 23, 1874.

NOTICES TO PROCEED.

949.—GEORGE, R., Worcester, "Improvements in taps, valves, and stop-cocks." March 17, 1874.

1055.—NIELD, T. A., Dukinfield, "Improvements in taps or valves adapted for use in controlling the flow or discharge of steam and other hot fluids." March 26, 1874.

1189.—PATTISON, J., Naples, "Improvements in automatic hydraulic apparatus for working pumps and compressing air." April 4, 1874.

1338.—WANCHOPE, A., Niddrie, and COWAN, J., Dublin, "Improvements in the manufacture of gas." April 17, 1874.

2197.—NEWTON, H. E., Chancery Lane, London, "Improvements in gas-burners." A communication. June 24, 1874.

2374.—FORBES, Rev. G. H., Broughton, Northampton, "Improvements in the manufacture of cements." July 7, 1874.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

431.—DENNIS, T. H. P., Chelmsford, "A new or improved water-waste preventer." Feb. 3, 1874.

752.—MALLINSON, J., Welwyn, "Improvements in steam and other cocks." Feb. 28, 1874.

848.—GOODALL, R., Armley, near Leeds, "Improvements in the means or method of purifying foul water or sewage, and in the apparatus employed in connexion therewith." March 7, 1874.

873.—NEWTON, A. V., Chancery Lane, London, "An improvement in pumps." A communication. March 10, 1874.

1944.—HOWES, W. H., Curtain Road, London, "Improvements in means or apparatus employed in the manufacture of gas for lighting and heating purposes, part of which improvements is also applicable to gas-meters." June 4, 1874.

1992.—WALKER, W. T., Highgate, "Improvements in the method of working gas-purifiers." June 8, 1874.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1896.—IRVINE, A. K., "Improvements in apparatus for the safe combustion of inflammable gas, and applicable for mine-lamps, for indicating danger, and for signalling." July 20, 1871.

1897.—FENTON, F., "Improvements in the purification and utilization of sewage and other refuse matters, whether in a liquid, semi-fluid, or solid state, and in the extraction or production therefrom of 'magma,' 'scak,' grease, soap, tallow, or oil." July 20, 1871.

1919.—WARNER, R., and BROOKE, J., "Improvements in pumps." July 21, 1871.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

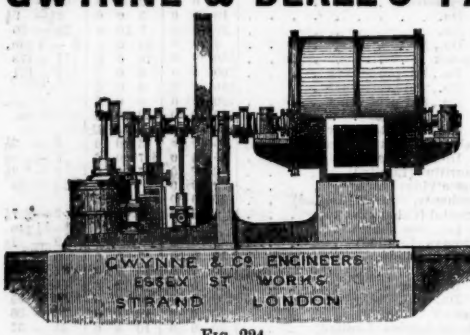


FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.

Made under the personal superintendence of

Mr. BEALE,

The oldest Maker, Inventor and Patentee of GAS-EXHAUSTING MACHINERY.

(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

Prices and every information on application.

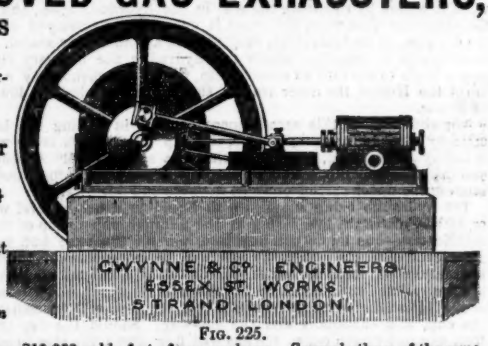


FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES, CAN BE HAD ON APPLICATION TO

GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.

G. & Co. are now manufacturing for a London Gas Company three of their 210,000 cubic feet Patent Gas Exhausters, and many of all sizes.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

WANTED, a steady Man for a small Gas-Work in Somersetshire. A married man preferred. Wages 16s. a week, with cottage, coal, and gas.
Apply to Mr. S. DAWES, Clevedon, near BRISTOL.

WANTED, a situation as Manager or Foreman of a Gas-Work. Has had 30 years experience of Gas-Works.
Testimonials or references on application to P. CANN, Hall Style Bank, HEXHAM.

WANTED, a Manager, to take sole charge of small Gas-Works. Fitting required. Wages 22s. House, coal, and gas.
Apply to W. R. HIGH, Abbots Langley Gas-Works, Watford, HERTS.

WANTED, an experienced Gas-Fitter, one competent to lacquer and used to general shop work preferred. To a steady and good workman the situation will be permanent. State wages required and give references.
Apply to the MANAGER, Gas-Works, JERSEY.

WANTED, for a small Gas-Work in Lancashire, a steady working Man as MANAGER. Must understand laying mains and have a good knowledge of gas-fitting.
Applications, stating experience, age, references, wages, &c., to be addressed to J. T. HALL, Engineer, PRESCOT.

WANTED, by a practical Gas Man, the MANAGEMENT of a small Gas-Work. Can lay mains, services, and do internal fittings, attend to and take indices of meters, and the general work of a gas plant. Married. Good references (and security).
Address JAMES STAGLES, 1, Sandy Land Street, Wisbeach, CAMBRIDGESHIRE.

GAS MANAGER WANTED.

WANTED, a practical and experienced MANAGER, for the Lisburn Gaslight Company, Limited. Salary £120 per annum, with free house, fuel, and light. Security required.
Applications, with testimonials, will be received up till the 13th of August by JOHN M. CLUBE, Secretary.
Lisburn, July 29, 1874.

WANTED, by a Gentleman, aged 27, a situation as MANAGER, on the Continent or abroad. Advertiser has been four years in present situation, where the make is above 90,000,000 feet per annum. Understands the manufacture and distribution of gas in all its branches. Speaks French and Italian. Leaving present situation on account of salary being insufficient.
Address SCIENCE, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Advertiser, aged 29, an engagement as MANAGER, Assistant Engineer, or Superintendent of a Gas-Work. Thoroughly understands the manufacture and distribution of gas, having had 13 years experience in designing, erecting, and managing. Fair draughtsman. Has a knowledge of accounts and of chemistry. Can analyze gas, &c., and use the photometer. Can produce testimonials or give references
Address E. A., 18, Cawley Road, SOUTH HACKNEY, E.

TO GAS AND WATER ENGINEERS.

WANTED, in a contractor's office, a thoroughly experienced ENGINEER. One who is fully qualified to prepare plans and specifications and to detail out quantities and costs of both Gas and Water Works.
Applicants must be thoroughly reliable, good men of business, and of unimpeachable character. Permanent salary £250 a year.
Give amount of experience, age, family, and references, to ENGINEER, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

PURIFIERS.

WANTED, either four Purifiers, 8 ft. square, or three 10 ft. square, second hand, in good condition. Neither centre-valve nor sieves required.
Address, stating where the purifiers may be seen, and the price, to ENGINEER, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

VINCENT'S
PATENT IMPROVEMENTS
IN
Apparatus for Manufacturing Gas.
Particulars to be obtained by application to—
MR. LAYARD JONES,
ENGINEER,
25, OLD BROAD STREET, LONDON, E.C.

ADVANTAGES OF GAS FOR COOKING AND HEATING,
BY
MAGNUS OHREN, A.I.C.E., F.C.S.

For Companies to issue to their gas consumers.
Specimen Copy by post 4d., direct from MAGNUS OHREN, Gas-Works Lower Svdenham, London, S.E.

THE AUTOGEN PURE GAS COMPANY, LIMITED.
CAPITAL £24,000, in Shares of £1 each.
Temporary Offices:
17, QUEEN VICTORIA STREET, MANSION HOUSE, LONDON, E.C.
This Company is prepared to enter into CONTRACTS for the supply of their SELF-ACTING APPARATUS, varying in size from 12 inches upwards, for the manufacture of gas for lighting and heating private houses, churches, manufactories, railways, ships, &c., and they invite the public to inspect the process exhibiting the purity, quality, &c., any day, between the hours of Two and Six p.m., on production of their cards.
Every information as to prices, contracts, &c., as well as prospectuses, reports, and forms of application for shares, may be obtained as above. By order.

SLIDE-VALVES.

FOR SALE—14 12-in. and 5 10-in. Slide- VALVES with outside racks. They have been thoroughly re-fitted, and are equal to new. A low price will be accepted to effect a clearance.
Apply to JAMES WATSON, Engineer and Manager, Crystal Palace District Gas Company, LOWER SYDENHAM, S.E.

PURIFIERS FOR SALE.

TWO Oblong Purifiers, 6 ft. by 4 ft., and 3 ft. 6 in. deep, cast-iron covers, excellent lifting gear, hydraulic change-valve, wood grids, with all the 6-in. connexions complete.
The above are in first-rate condition, very neat and compact, admirably suited for a small works, and only removed in order to make room for a larger set.
For further particulars apply to R. M. TURNER, Manager, Enniskillen Gas-Works, Ireland, or Mr. MALAM, Gas-Works, HALIFAX.

THE BATH GASLIGHT AND COKE COMPANY.

TO CONTRACTORS.

THE Directors of the above-named Com- pany are prepared to receive TENDERS for the excavation and masonry necessary for the formation and completion of a STONE and BRICK TANK, 152 ft. 6 in. diameter, and 27 ft. 9 in. deep.
Plans and specifications may be seen upon application to the Secretary, at the Gas Company's Office, Upper Bristol Road, Bath.
Sealed tenders, endorsed "Tender for Tank," to be sent, addressed to the Chairman of the Directors, on or before the 18th day of August next.
The Directors do not bind themselves to accept the lowest or any tender.
By order of the Directors,
GEORGE HELPS, Secretary.
Offices, Upper Bristol Road, Bath, July 29, 1874.

NEWPORT (MON.) GAS COMPANY.

TO CONTRACTORS AND BRICKLAYERS.

THE Directors of the above Company are prepared to receive TENDERS for the construction of a brick GASHOLDER-TANK, at their Gas-Works, Newport, Monmouthshire.
The Tank is to be 100 ft. in diameter, and 25 ft. 6 in. deep, inside measure, when completed.
Plans and specifications may be seen upon application to Mr. Henry Bowen, Engineer, Cardiff, or to the Manager, at the Company's Offices, Newport.
Sealed tenders, addressed to the CHAIRMAN of the Directors, and endorsed "Tender for Brick Tank," to be sent in on or before the 8th of August next,
The Directors do not bind themselves to accept the lowest or any tender.
Gas-Works, Newport, Mon., July 13, 1874.

IN CHANCERY.
IN THE MATTER OF THE COMPANIES ACTS, 1862 AND 1867, AND
IN THE MATTER OF THE PATENT GAS COMPANY, LIMITED.

THE Creditors of the above-named Company are required, on or before the 15th day of September, 1874, to send their NAMES and ADDRESSES, and the particulars of their DEBTS or CLAIMS, and the names of their Solicitors, if any, to François Mackenzie, Joseph Weatherley, and Augustus Albert Smith, the Liquidators of the said Company, at the Office of the Company, 25, Fenchurch Street, in the City of London, and if so required by notice in writing by the said Liquidators, or by their Solicitors, to come in and prove their debts or claims at the Chambers of the Vice-Chancellor Sir Richard Malins, No. 3, Stone Buildings, Lincoln's Inn, in the county of Middlesex, at such time as shall be specified in such notice, or in default thereof they will be excluded from the benefit of any distribution made before such debts are proved. Monday, the 2nd day of November, 1874, at Twelve o'clock, is appointed for hearing and adjudicating upon the debts and claims.
Dated this 22nd day of July, 1874.
FREDERICK HERITAGE, Solicitor for the Liquidators.
28, Nicholas Lane, E.C.

FERNDALE GASLIGHT AND COKE AND WATER-WORKS COMPANY, LIMITED.

TO BUILDERS, GAS APPARATUS MAKERS, PIPE-FOUNDERS, AND OTHERS.

THE above Company solicit TENDERS for work to be done in the ERECTION of GAS-WORKS at Ferndale, near Pontypridd.
Contract No. 1.—The excavation, masonry, &c., for a cast-iron Gasholder-Tank, the building of Boundary Walls, and the erection of all buildings requisite in the construction of such Gas-Works.
Contract No. 2.—The taking down, removal from Aberdare, and re-erection at Ferndale of a Cast-Iron Tank, Gasholder, &c., and the supplying and erection of all additional and requisite new Apparatus.
Contract No. 3.—Laying about 4000 yards of Street Mains.
Contract No. 4.—The making and delivery of about 4000 yards of Cast-Iron Common Socket and Spigot Main-Pipes, with all irregular castings necessary in laying the same.
Full particulars may be obtained, and inspection of the plans and specifications, on application to Mr. JOHN LEES COCKER, Gas-Works, Merthyr Tydfil.
Sealed tenders, to be forwarded to the undersigned, endorsed with the No. of the Contract, on or before the 8th of August next.
The Directors do not undertake to accept the lowest or any tender. By order,
J. EDWARDS PRICE, Secretary.
The Court House, Pontypridd.

PATENT FUEL AND LIME FOR PURIFYING FROM FOUL LIME.
By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.
Licences to work the invention will be granted to Gas Companies on very reasonable terms.
For further particulars apply to Mr. E. MADDOCKS, Manager of the Gas-Works, KETTERING.
The adoption of the above invention, without a licence from the Patentee, will be an infringement of the patent, and will subject the person or company guilty of such infringement to legal process.

RATCLIFF GASLIGHT AND COKE COMPANY.
OFFICES, 345, CABLE STREET, LONDON, E.,
Aug. 1, 1874.
NOTICE is hereby given that a HALF-YEARLY GENERAL MEETING of the SHAREHOLDERS of this Company will be held at the Company's Offices, as above, on WEDNESDAY, the 19th day of August inst., at Two o'clock in the afternoon precisely, to declare a Dividend for the half year ended June 30, 1874, and for other general purposes of business.
And NOTICE is hereby further given that the register of transfers will be closed from the 14th of August inst. to the 19th of August inst., both days inclusive.
By order of the Board,
H. J. BADDELEY, Secretary.

TO GAS COMPANIES.

A Quantity of Bright Derbyshire Gas COAL, of excellent quality, having been carefully tested in practical working, FOR SALE.
For quotations, address Mr. W. A. PLUMBE, MANSFIELD.

CANNEL.

THE West Yorkshire Iron and Coal Company, Limited, will be glad to receive FORMS for TENDERS from Gas Companies and others requiring a supply of CANNEL.
Address, 72, Wellington Street, LEEDS.

TO COLLIERY OWNERS, &c.

THE Directors of the Barnsley Gas Company hereby invite TENDERS from parties willing to contract to supply and deliver at their works, situated at Old Mill and Pontefract Road, Barnsley, respectively, RIDDLED SLACK, or NUTS, and SOFT COAL of the best quality, for Gas Making, that they may require for a period of One, Two, or Three years (as may be agreed upon), from the 1st day of October, 1874; the said Nuts or Coal to be delivered in a dry condition, free from smudge, dirt, shale, pyrites, or other impurities, at either of the said works, in such quantities and at such times as the Manager may direct. There are railway sidings into both works, or, if more convenient to the parties tendering, they may deliver the said Nuts or Coal by cart at either of the said works, which latter method the Directors would prefer.
Prices may be quoted either by cart or rails, and sealed tenders, stating respectively the price for Nuts or Coal delivered as above, endorsed "Tenders for Coal," and addressed to the Chairman, must be left at the Gas Company's Office on or before Thursday, the 13th day of August next.
Any further information required may be obtained on application to the Manager, at the Works.
The Directors do not bind themselves to accept the lowest or any tender. (By order)
Gas Offices, Pontefract Road, JOHN HUTCHINSON,
Barnsley, July 24, 1874. Manager.

PIPES.—A large stock of 3-in., 4-in., 6-in., and 8-in. Cast-Iron SOCKET and SPIGOT PIPES (usual weights) ready for immediate delivery, either f.o.b. or ex ship or steamer in the Thames.
Address the MANAGER, Milton Iron-Works, WEST HARTLEPOOL.

COTTERILL'S PATENT STEEL TUBE- DRILLS, for connecting services to water, gas, and steam mains and boilers under pressure, without any escape of water, gas, or steam. They drill and tap themselves, and are left in the mains. The connexion is therefore perfect.
For prices and other information apply to CHARLES FORSTER COTTERILL, Finney House, Cannock, STAFFORD, Patentee.

HOPKINS, GILKES, & CO.,
LIMITED,
MIDDLESBOROUGH,
SUPPLY GAS & WATER PIPES of EVERY SIZE.
Plain, Turned and Bored, and Coated.
CAST-IRON RETORTS.
Castings for Gas-Works of every description.
EXHAUSTERS.
LONDON OFFICE: 25, LAURENCE POUNTNEY LANE.

Just published, price 10s. 6d.,

REGISTRATION OF DISTRIBUTORY PLANT.
The forms for this purpose are to illustrate the Paper on Distribution of Gas, read at the Edinburgh Meeting of the British Association of Gas Managers. By the use of the synopsis the whole of the out-door plant may at once be seen, with all matters pertaining to the same.
W. J. WARNER, Engineer.
South Shields.

Now ready, price 7s., by Post 7s. 3d.,
A SECOND EDITION (fcap. 8vo., morocco gilt)
OF
THE GAS MANAGER'S HANDBOOK.
BY THOMAS NEWBIGGING, A.I.C.E.
WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

16th edition, 1000 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000,

BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B Instruments, Bells, and Apparatus.
J. BAILEY and Co., Albion Works, Salford, LANCASHIRE.

Mr. ALFRED LASS,
60, CORNHILL, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

MR. NORWOOD EARLE, late of the Dover Gas-Works, is prepared, after 17 years experience, to undertake the duties of SURVEYOR to Gas Companies and Corporations in all matters relating to the Distribution of Gas and Gas Testing. Contracts entered into for the Survey of Mains, Services, Public Lamps, &c., in order to reduce the per centage of unaccounted-for gas to the lowest possible amount.

Valuations for Assessment, Transfer, and other purposes.

Arrangements made with Companies desiring the occasional use of an Office in the City.

12, QUEEN VICTORIA STREET, LONDON, E.C.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 42, Parliament Street, WESTMINSTER.

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.

HENRY GREENE AND SON, Sole Consignees of Brönner's Patent Improvements in Gas Lighting, 16 and 17, King William Street, LONDON, E.C.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. MANWARING, 101 Cannon Street E.C.

OXIDE OF IRON.—We are prepared to supply, on moderate terms,
HYDRATED PEROXIDE OF IRON (BOG OCHRE),
Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.
FRANCIS RITCHIE & SONS,
BELFAST.

THOMAS CARR & SON,
MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS, &c., &c.,
SCOTSWOOD FIRE-BRICK WORKS,
NEAR
BLAYDON-ON-TYNE.

E. GODDARD,
GAS-WORKS, IPSWICH,
SOLE AGENT FOR
EDGE'S PATENT
FOR REMOVING THE
CARBONACEOUS INCRUSTATION FROM GAS-RETORTS.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

FIRE-CLAY RETORTS.

WILLIAM FRASER,
INVERKEITHING,
(Owner of the Works at which Fire-Clay Retorts were first made), can supply
RETORTS, FIRE-BRICKS, &c.,
to any extent.

References can be given to managers of above a hundred Gas-Works whom he supplies.

He ships at Charlestown his
CELEBRATED HALBEATH STEAM COALS,
on Navy List.

JAMES NEWTON & SONS.
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPOT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

ALFRED WILLIAMS,
PHŒNIX FIRE-BRICK WHARF,
64, BANKSIDE, SOUTHWARK, LONDON, S.E.

GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

SPENCE BROS. CHEMICAL COMPANY, LIMITED,
MANUFACTURERS OF
SULPHATE OF AMMONIA, VITRIOL, PATENT DRY COPPERAS, &c.
PURCHASERS OF
SPENT OXIDE AND AMMONIACAL LIQUOR;
AND CONTRACTORS FOR THE
PURIFICATION OF COAL GAS.
ALL COMMUNICATIONS TO
VICTORIA CHEMICAL WORKS, BRADFORD, MANCHESTER.

GEORGE ORME & CO.,
GAS METER MANUFACTURERS, BRASSFOUNDERS & FINISHERS,
ATLAS METER-WORKS, OLDHAM.

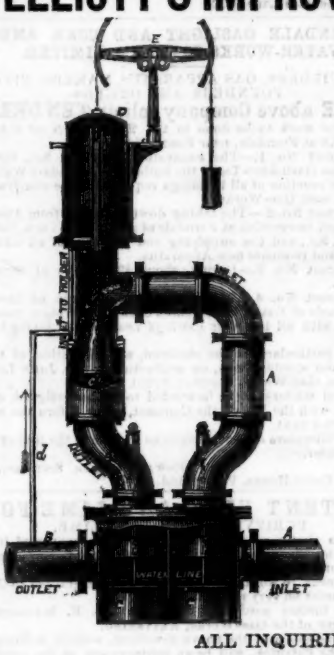
CONSUMERS WET & DRY GAS-METERS ON THE MOST APPROVED PRINCIPLES.
STATION-METERS, GOVERNORS, PRESSURE-REGISTERS,
And every Description of Gas Apparatus.
GAS, STEAM, AND WATER FITTINGS.

EASTWOOD & CO.,
LIMITED,
Wellington Wharf, Belvedere Road, Lambeth,
AND
Canal Bridge Wharves, Old Kent Road, S.E.
LIME, CEMENT, AND BRICK MANUFACTURERS
AND MERCHANTS.
SHOEBURY AND KENT STOCKS, AND SUFFOLK RED AND WHITE BRICKS DELIVERED IN ANY QUANTITIES, OR BY BARGE ALONGSIDE.

Stourbridge, Newcastle, and Welsh FIRE-BRICKS and LUMPS of all descriptions.	Malam and Moulded Bricks, PORTLAND CEMENT (made from the Medway Earth, &c.) of UNSURPASSED quality.	Grey Stone Lime, FLARE LIME Chalk Lime, Blue Lias, Roman and other Cements.

ALSO
BUILDING GOODS OF ALL DESCRIPTIONS.

ELLIOTT'S IMPROVED STATION GOVERNOR.



The advantages of this Governor are—

1. The entre absence of oscillation.
2. No danger of explosion.
3. Perfect uniformity of pressure.
4. Economy of space; a 15-inch holder being sufficient for a 10-inch Governor.
5. The holder can be placed at any height in relation to the cone.
6. It admits of a simple, effective, and cheap bye-pass arrangement.

LIST OF PRICES.

For Governor only.		Governor, with Hydraulic Bye-Pass, complete.	
3 inch . .	£12 15 0	3 inch . .	£19 5 0
4 ,, . .	14 8 0	4 ,, . .	21 5 0
5 ,, . .	16 4 0	5 ,, . .	25 15 0
6 ,, . .	18 14 0	6 ,, . .	28 10 0
7 ,, . .	21 6 0	7 ,, . .	33 0 0
8 ,, . .	23 15 0	8 ,, . .	38 10 0
10 ,, . .	26 5 0	10 ,, . .	44 0 0
12 ,, . .	30 10 0	12 ,, . .	48 0 0

Prices for Larger Sizes on application.

ALL INQUIRIES TO BE ADDRESSED TO
J. ELLIOTT, STOURBRIDGE.

THE PATENT

"UNIVERSAL" STEAM PUMP

WAS AWARDED, AT THE

VIENNA EXHIBITION, 1873,

THE GRAND PRIZE "MEDAL OF PROGRESS."

OPINIONS OF

THE PRESS.

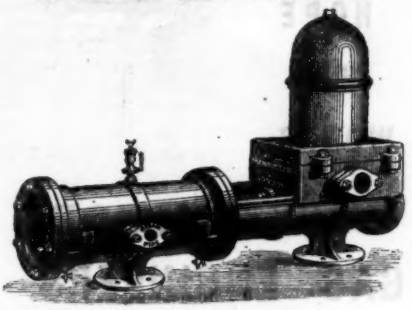
"The simplest machine of its kind."—*Engineering.*

"Remarkable for its simplicity and ease of action."—*Daily Telegraph.*

"None that we have noticed work so quietly."—*The Engineer.*

"Nothing invented in hydraulic steam power half so cheap and effectual."—*Griffith's Iron Trade Exchange.*

NO TAPPET VALVES OR GEAR.



IN USE IN SOME OF

THE PRINCIPAL GAS-WORKS IN LONDON, SHEFFIELD, PENISTONE, &c.,

FOR

TAR AND AMMONIACAL LIQUORS.

One selected from amongst many Testimonials received by H. T. & Co.:—

"*Ardwick Bridge Chemical Works, Manchester, Oct.* 28, 1872.

"Sir,—The 'Universal' Steam Pump obtained from you, and which has been employed during the last six months pumping caustic soda at these works, still continues working satisfactorily. "Yours truly,

(Signed) "PETER HART, *Manager.*"

SOLE MAKERS,

HAYWARD TYLER AND CO.,

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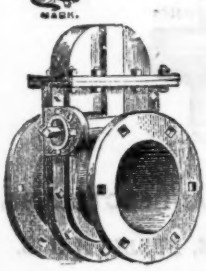

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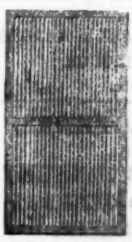

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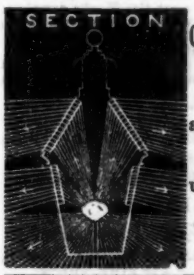

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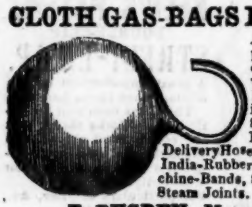

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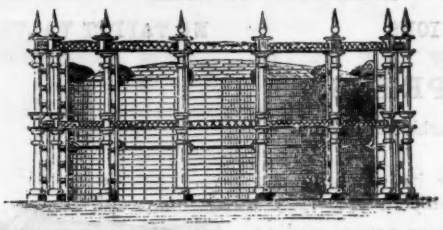

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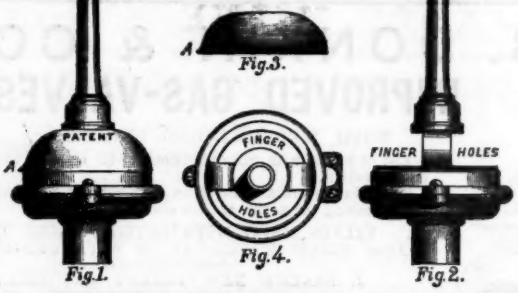

Fig.3. *Fig.1.* *Fig.4.* *Fig.2.*

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PATENTEES OF
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Attention is respectfully requested to the following extract from a lecture "On the Economical Combustion of Coal Gas," delivered to the Philosophical Society of Glasgow, by Dr. W. Wallace, F.R.S.E., F.C.S., Gas Examiner for the city of Glasgow, on the 4th of March last:—
"A few years ago, a simple form of Gas Regulator for Street Lamps was introduced, I do not know by whom, and various forms of it, and improvements on it, have been made by many practical gas engineers. Of all the modifications of the instrument, the best in my opinion is that of Mr. D. Bruce Peebles, of Edinburgh; in fact, his Lamp Regulators are so superior that they are likely to supplant all others. Already about 9000 of these have been applied to the street-lamps in Glasgow, and I understand it is the intention of the authorities to introduce them all over the town. The saving thereby effected I calculate to be about £6000 per annum, without any diminution of light. One of the great advantages of Mr. Peebles's apparatus over all others is that it can be regulated while the gas is burning."
Since the above date, another 1000 have been supplied to Glasgow, and they are being largely adopted at home and abroad.

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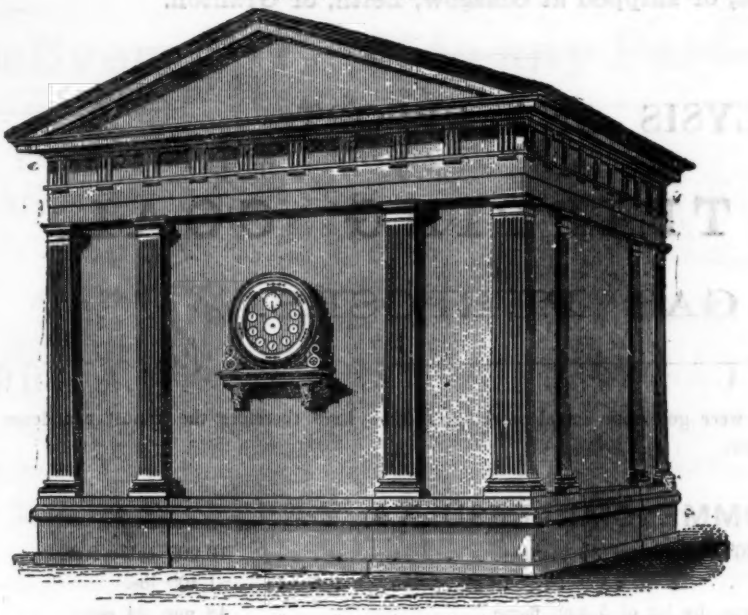

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RETORT SETTINGS, heated by tar without the production of smoke.

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One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

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This Coal bears a close resemblance to the Lesmahago seam. It has a first-class Coke, equal to the Lesmahago, and greater in quantity, and 10,538 Cubic Feet of 33·2 Candle Gas.

For rail in Scotland, or shipped at Glasgow, Leith, or Granton.

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ON
CLIMPY TRIPPING COAL,
FOR GAS PURPOSES.

The results of this analysis, as shown below, were got from actual working, and we have therefore the utmost confidence in placing it, along with that annexed, before you.

COMMERCIAL RESULTS.

Gas per ton of Coal—temperature 60°—barometer 30 inches	10,200 cubic feet.
Coke per ton of Coal	1,400 lbs.
Durability of one cubic foot of the gas, by jet of 5-inch flame	48 min. 24 sec.
Illuminating power in standard candles	14·9

REMARKS.

Being well acquainted with Durham and Northumberland Coals, I have no hesitation in saying that "CLIMPY TRIPPING" is superior to any (containing, besides, a greater proportion of pieces from 7 to 14 lbs. weight), with far less impurities for purification, more gas, and coke equal in calorific power. It has a large mixture of cannel nuts, which accounts for the good quality of the gas, at our photometer in town, 1000 yards from the works.

It is also a very superior Coal for mixing with oils, as by Mackenzie's patent; or with acid tar, or tar oil, shale grease, or other refuse from paraffin-works, as by system of Mr. Scott, of Musselburgh, or Mr. Foster, Portobello, the Coal being easily crushed.

Below are the results realized by myself, when mixed with acid tar from paraffin work, received by me in a solid state, having been run on to very fine dross. My charges were 2 cwt. tripping and 28 lbs. of acid tar, each retort, running six hours; with lighter charges I get more gas, but not so good quality, or so much coke.

Gas per ton of Coal	10,800 cubic feet.
Coke per ton of Coal	1,540 lbs.
Durability of one cubic foot of gas, by jet of 5-inch flame	58 min. 28 sec.
Illuminating power in standard candles	27·29

The first truck received being tried with very light charges (unmixed), and running five hours, I got 10,500 cubic feet of 14-candle gas; and I am confident, practical managers, with good retort-fittings (mine being very inferior), and exhausters at work, as I have seen generally at home and abroad, will take 11,000 feet of 13-candle gas from it. My retorts are 8 feet × 2 feet × 14 inches, D shape, heavy dip, and no exhauster.

These remarks of mine you may perhaps think rather lengthy, but they will be the more intelligible to any manager inquiring for Climpy Tripping.

L. MONK,
Engineer and Manager.

Lanark Gas-Works, April 20, 1874.

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(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6 0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

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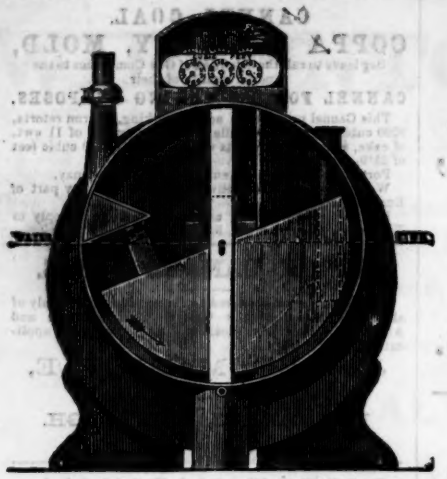

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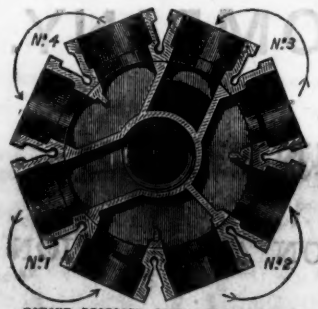

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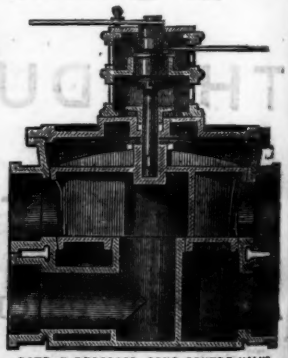

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